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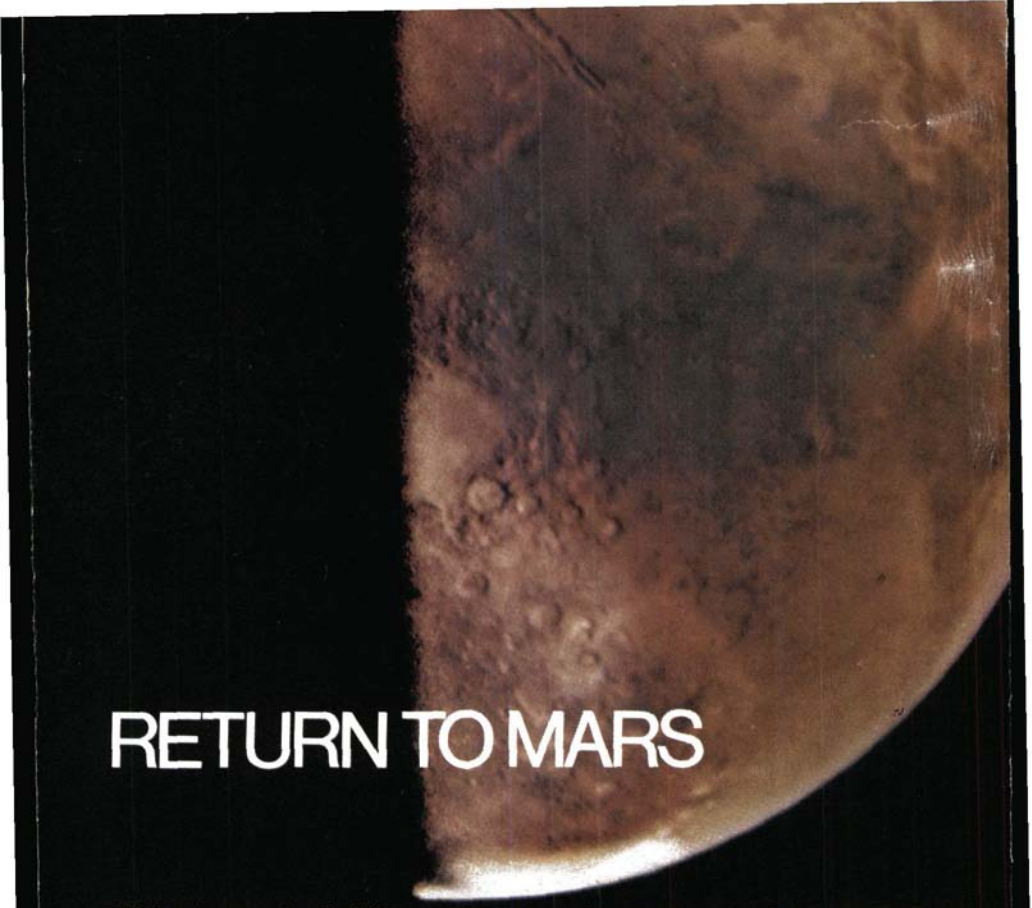

RETURN TO MARS

MARS, photographed by Viking 1 as the spacecraft approached the planet, 18 June 1976. Just below center of picture, near day-night terminator, is impact basin Argyre, bright with ground frost or morning haze. Frost also covers south polar region, below Argyre. To the north is the "Grand Canyon of Mars," Vallis Marineris. Tharsis region, at top of photo, is bright with cloud activity. *(Photo courtesy of NASA)*

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editorial

DIVERsification

There once was an aerospace company that owned a large, plush engineering Division that specialized in developing new re-entry vehicles (nose cones) for Intercontinental Ballistic Missiles.

For many years, through the late fifties and early sixties, this engineering Division prospered. The Air Force needed sturdy re-entry vehicles for the many squadrons of ICBMs that were being deployed in silos underground. After all, what's the point of building ICBMs unless their re-entry vehicles are good enough to survive their blazing hypersonic flight through the atmosphere and deliver their hydrogen bomb warheads on target?

The engineering Division grew and prospered. It employed thousands of engineers, and even more thousands of technicians, secretaries, various artisans and craftsmen, administrators, and even marketing specialists.

Then, as the Air Force stopped demanding new R/V's (as they were called in the jargon of the trade), the engineering Division faced a crisis. How to keep all these people employed?

The aerospace executives pondered mightily. The engineers wandered about, thinking hard. The administrators shuffled papers at a furious pace. But it was the marketing experts who came up with the solution:

Diversification.

After all, they argued, our Division has thousands of very bright engineers, very clever technicians and craftsmen. Let us set them to work on things other than re-entry vehicles. The Federal Government had just recently established New Priorities for a Great Society, with new Cabinet-level organizations such as the Department of Housing and Urban Development and (somewhat later) the Department of Transportation.

So the engineers, technicians *et al* were told to think new thoughts and find new fields to conquer—or at least, to find new sources of funding. This gladdened their hearts, for many of them had grown weary of working day after day on new methods for dropping megaton bombs on Communist strongholds.

And, lo! the ideas they came up with were legion. New machines for sorting mail, for the Post Office

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Department. New types of trains that rode on cushions of air, for the Department of Transportation. New prefabricated low-cost house-building techniques for the Department of Housing and Urban Development. New concepts in magnetic fluids for a thousand potential applications.

Yet when the accountants (despised by all except the management) checked up on the books at the end of the year, they found that all these wonderful new ideas—funded by the wonderful New Priorities of the Federal Government—showed no profit to the Division whatsoever. In fact, they were running deeply in the red, because the Division found it necessary to spend much more money on these new ideas than the Federal Government had available for funding.

Joe and Jack Haldeman are the third set of brothers to write science fiction, being preceded by Donald and Howard Wandrei and Earl and Otto Binder. In the Haldeman family, Joe has a headstart in first story to appear, first to write full-time, and first to win a Hugo. Invalided in the Viet Nam fighting by an explosive device that sent over a hundred fragments into his body, Joe won a Hugo at the 1976 World Science Fiction Convention in Kansas City for his depiction of an interstellar "grunt" in *The Forever War*, his first novel. This was written in early morning sessions before his seminars as Writer in Residence at Iowa State University.

Brother Jack shares Haldeman honors as a science fiction fan since his teen days in the District of Columbia area, but has the distinction of having been Chairperson of the 1974 World Science Fiction Convention in Washington. Before writing full-time, he worked long hours as a medical technician in a Washington hospital. His first Analog story appears in this issue.

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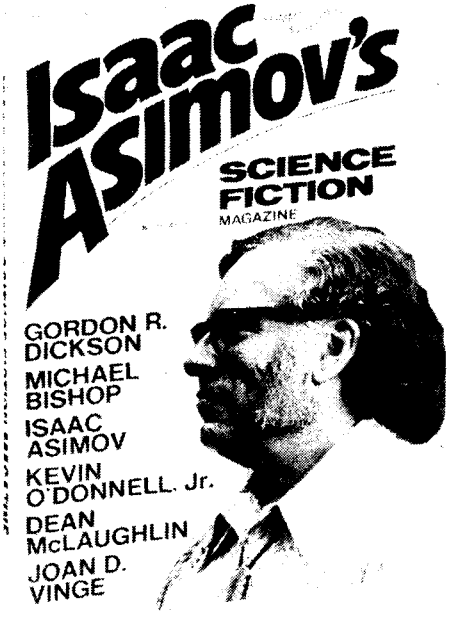

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And, surprise of surprises, the dreary, weary old R/V business was still bringing in enough money to keep the Division afloat financially.

Undaunted, the Division tried even more diversification schemes the following year, with even worse results. The new programs cost more than they produced in funding; the old R/V business—although shrinking—still brought in a tidy profit.

After many long arguments with all and sundry, the Division's marketing manager chalked up on his blackboard (which was actually green) a motto that governed his activities from that day onward: "If it doesn't re-enter, forget it."

The moral of this tale is rather simple. Diversification sounds good, noble and profitable, but it is usually impossible to get an organization to change its ways *unless you drastically change the organization.*

Underlying Richard Hoagland's science article in this issue is the tacit assumption that our space program must change its ways if we are to take maximum advantage of the trained personnel and working hardware that we have already invested in since the creation of NASA, nearly twenty years ago.

But can NASA "diversify?"

Consider the fundamental matter of propulsion. The cost of space operations is primarily the cost of getting people and equipment into orbit around the Earth. The "hard boost" from our planet's surface costs more in energy and dollars than any other factor involved in space operations. The lower the cost of boosting payloads into orbit, the higher the profit from operations in space.

NASA is composed of rocketry experts. *Chemical* rocketry experts, at that. The entire organization is built around the unconscious conviction that the way to get into space is with chemical rockets. To date, this has been a perfectly valid assumption. There has been no competing technology.

But how much longer will that situation hold true? How much effort is NASA putting into investigating new, different, possibly offbeat propulsion ideas? Electromagnetic drives? Laser boosting systems? Nuclear rockets?

Can NASA broaden its vision to produce honest efforts in nonchemical-rocketry ideas? The recent news that NASA is moving forward with studies of Solar Sails is heartening, and Hoagland shows what an invigorating effect such new technology can have on future space missions.

But my guess is that the really bold new ideas will come from outside the NASA organization. The question is, will NASA recognize good new ideas and support them, or will the bureaucratic impulse to quash ideas Not Invented Here keep us locked in to chemical rockets for so long that space operations will never be able to grow into the profitable endeavors that they might otherwise be?

THE EDITOR

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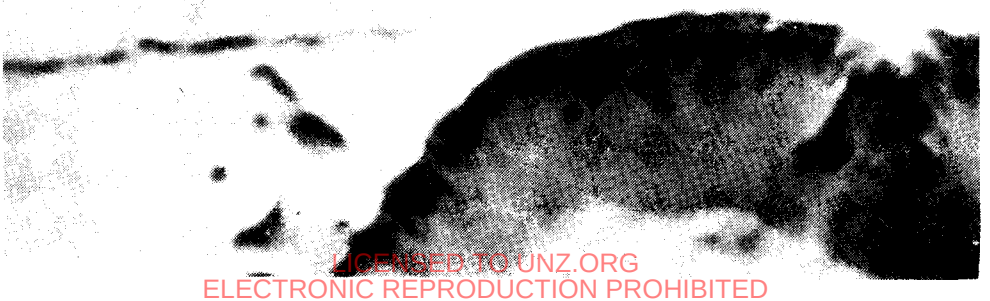
RETURN TO MARS

A MISSION FOR THE ENTERPRISE

The next mission to Mars can (will?) be a manned expedition.

Richard C. Hoagland



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Science never proceeds without scientists. A number of scientists have staked their entire careers, public reputations and perhaps the Nobel Prize, on discovering life beyond the Earth. It is this reason which, in the long run, may determine *whether* and *when* we return to Mars . . . if ever. For the fear of being wrong (of looking silly!) is the largest single factor preventing the VIKING Biology Team and other VIKING scientists from taking a much more positive position on what VIKING is trying valiantly to tell us about Mars.

As we said in the December 1974 issue of Analog, VIKING is a sort of "last gasp" for our study of Mars. Nothing has been planned to follow VIKING. The reasons are depressingly simple: lack of money and support.

While the scientists ponder the fascination and chagrin of a *too active* Mars (instead of one totally lacking activity), and the press attempts to report the daily theories, hypotheses, and changing data streaming down from Mars—the public (the guys who paid their billion dollars for this exercise) is wandering away. And we may never get them back.

The problem is the embarrassment of riches. Not only was there activity at both landing sites, it appeared in all three biology experiments, and at a level totally unexpected! To understand precisely the dilemma this has presented, one must understand a fundamental property of VIKING's instruments. They all were designed to measure the end products of *chemical* reactions—radioactive atoms given off from organic compounds evolved through metabolic chemistry, and labeled nutrients reduced to other radioactive by-products. That was the rub. For there could be two alternative explanations for these chemical end products: life (which, after all, is really complicated chemistry), or some other form of "fancy"—a word which got a lot of use at JPL—chemistry which could *mimic* life, because of the relatively crude nature of VIKING's biological experimental probes.

Within the constraints of 35 pounds of weight, 30 watts of power, and 1 cubic foot of space, TRW accomplished a technological miracle. (Fig. 1) They produced a complete biology instrument composed of 39 mini-latching valves, 43 heaters, analysis instrumentation, sensors, and about 40,000 miscellaneous electronic components. NASA set *two* of these marvels down on the surface of another world 200 million miles from the nearest screwdriver. To my knowledge, since the two landings were accomplished, not *one* component failure, or sticking valve, or fluid-line stoppage has occurred; and some of those myriad lines, which must deliver water, CO_2, nutrient, helium, and other liquids and gases in precise amounts, had hollow cores thinner than a human hair! None of all the possible horrors

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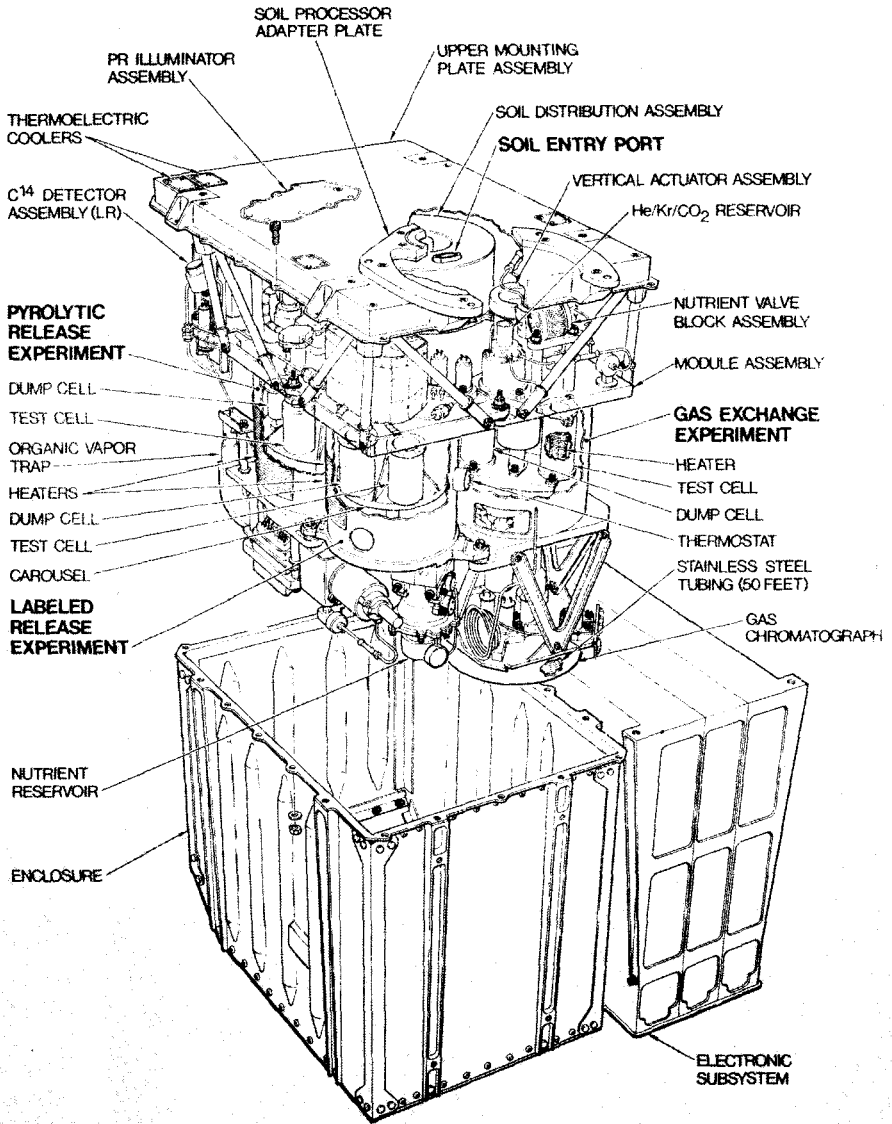

Figure 1. *VIKING Lander biology experiment package.*

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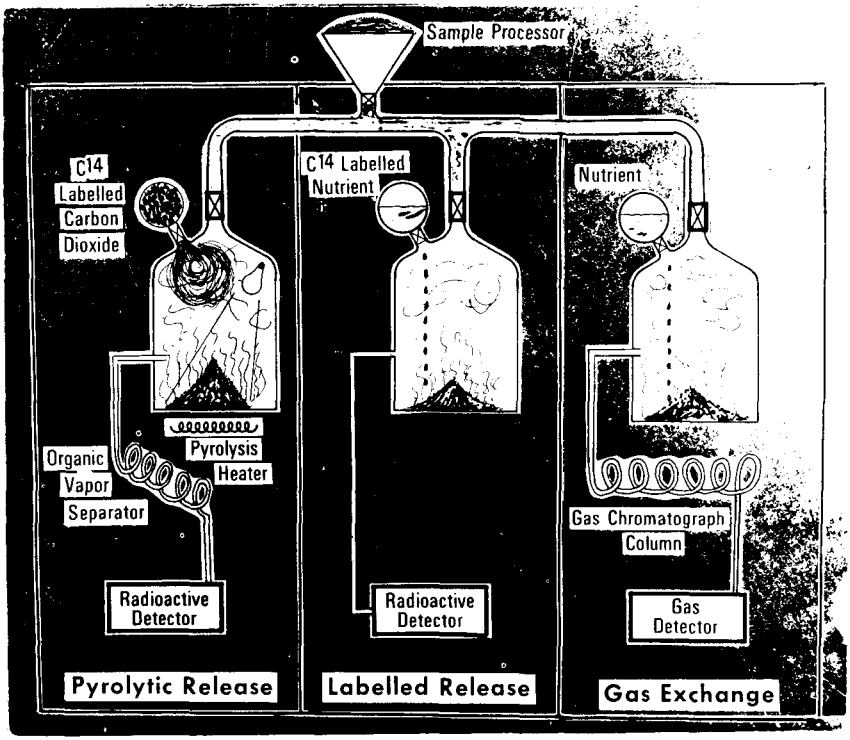

Figure 2. *The three biology experiments of VIKING.*

which could have happened within that 1 cubic foot of wizard engineering, has occurred. It's downright unnatural in a program where "Murphy" is on the payroll of every contractor.

Within this compact miracle, called the VIKING Lander Biology Instrument, *three* independent and in many ways opposite experiments were conducted. (See Fig. 2 and Tables 1 and 2, pp. 21-22).

One, called the Pyrolitic Release (PR) Experiment, looked for potential Martian plant life under artificial sunlight and conditions of temperature and humidity best akin to the Mars of today. Its primary assumption was that reactions due to photosynthesis are present, and its objective was to measure the production of organic molecules by prospective "Martians."

A second experiment called the Labeled Release (LR), fed any hypothetical Martians a specially prepared nutrient which contained ra-

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dioactive Carbon 14 atoms. Theory stated that if something ate the nutrient, CO_2 would be released as a waste product, which would then show up as an increase of counts in a radioactive detector mounted upstairs in a separate chamber. The vitally important thing to remember about these two experiments is that PR measures primarily organic *production* reactions stimulated by sunlight—photosynthesis. The LR measures metabolism (organic *destruction*) by animals, not plants, in a dark environment. In VIKING's case, the animals would have to be very small, but then most of the animal life on Earth is microscopic.

Well, what did you expect . . . giraffes?

Continuing. The third and last experiment was called Gas Exchange (or GEX—rhymes with Rex). GEX measured the exchange of gases over a period of time due to the hoped-for metabolism of some living thing dumped into the chamber with Martian soil. A gas chromatograph was the analysis instrument. From time to time, after nutrient (different from the nutrient in LR) had been injected into the soil, the gases being given off, for *whatever reason*, were monitored and the readings relayed to Earth. But, and this is critical, the sensitivity of GEX (because of the use of a chromatograph as opposed to radioactive tracers) is one thousand times *less* than the other two experiments.

That's it. Three experiments measuring two opposite chemical reactions, oxidation and reduction, over a wide range of assumptions—Martian dry and cold, warmer and moister, humid and tropical, drowning—any kind of environment Martians might possibly like to live in.

The odds against getting a reaction in even one of these experiments were pretty high, as all the biologists kept quoting before launch. In an interview with TRW's Don Bane sometime before the launch, I asked him what would happen if we got positive reactions in all three experiments. His reaction was incredulity that I could even pose such an obviously silly question.

VIKINGS I and II have been reporting very strong positive reactions in *all three* experiments of the Biology Package. And no one really understands why! A fact which introduced simultaneous "far-out" chemical extravaganzas and great unwillingness to accept equally "far-out" biology as the explanation for the analytical quandary.

As Dr. Klein, Chief of the VIKING Biology Team, put it, "To accept these results as biology would imply *two* or more different types of organisms and a vastly more efficient recycling of organic matter." For, another critical experiment designed by Dr. Klaus Biemann to detect essentially the dead organic residue of life—which literally "drips" from any terrestrial soil—this critical experiment, Organic Analysis, could find *no* organic compounds in the sands

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of Mars, down to the part per billion level.

And, while most scientists are now willing to accept organic compounds without life, none would or could accept life without organic residues. It wasn't "earthlike."

Sometime in the first hectic two weeks on Mars, as conflicting result piled on conflicting result; as laboratory control experiments faithfully came up properly negative; as fresh experiments on Mars repeated initial results; as experiments which varied due to subtle temperature changes revealed readings totally consistent with the equivalent subtleties associated with living biochemistry, it dawned on us that VIKING wouldn't tell us! That all of us, many of whom had trekked halfway around the world to see VIKING answer the question of life's existence on Mars, were witnessing the rise of a new Era of Uncertainty in the continuing Martian saga. And it dawned on the scientists, about this time, as well.

We began to hear about VIKING III.

Even before the confusing results of VIKING's supposedly definitive analysis of life or non-life on the planet, the guys at JPL were waxing enthusiastic over what could be accomplished if our Landers had mobility. There was, in truth, an almost overwhelming urge to stride across the strangely familiar yet truly alien scenery, to reach the ridgeline, to gaze from that new vantage on . . . what? With VIKING I and II we would never know.

Our gaze and the reach of all the sophisticated instruments of VIKING were confined for the lifetime of the Landers, however long that was to be; to just these two achingly

Figure 3. *Suggested "Mars Rover."*

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limited locations on the surface. For all we knew, a towering collection of crystal spires, an ancient Martian city, could be just over that distant western hill. But, with the VIKING technology, we would never know!

We had been told that, for about half the price of the current missions, the remaining VIKING spacecraft, the back-up Orbiter and Lander, could be modified for a 1981 Mission back to Mars.

These modifications would include wheels or treads (See Fig. 3), larger nuclear power generators, some sophisticated additions to the analytical experiments, plus some miscellaneous modifications to enhance the landability, computer storage, and a probable change of cameras.

. . . So we send VIKING III to Mars. So what. We've added additional carousels of reagents to test for various forms of chemistry (both "normal" and "exotic"); we've changed the cameras; added, perhaps, a microscope; put it on wheels; and managed to set it down in an *interesting* place, as opposed to the deliberately dull ones we were forced to select for the safety of VIKINGS I and II.

Let's say we have done all that, spending another billion or so. Now, we are again on Mars, with VIKING III. We have the public's attention, once again. Sagan is back on television; everyone is primed. This time, we are "loaded for bear" (or the Martian equivalent).

What happens if the results are as confusing and ambiguous as they now are?

But, I hear you exclaim, that *can't* happen.

That's what Don Bane told me about VIKING I and II.

It should be dawning on a lot of people by now, particularly some VIKING scientists, that Mars is an alien world. We keep saying that it has undergone 4.5 billion years of independent evolution. But no one has really believed this. Perhaps VIKING is trying to describe an alien biology on an alien planet. Perhaps. The whole point is to learn from our initial confrontation with such an alien environment. And a machine, even an advanced VIKING III, by its nature, would have to be sent to Mars with another entire set of built-in assumptions about the place. I'm willing to bet doorknobs to doorknockers that Mars has more surprises ready to throw at those silly things that lately "keep falling out of the sky!"

Thus, from my vantage point on Mars last summer, I compiled a list of "little things" which I know is going to delight some team of engineers which will someday have to make a Rover work--at least 50 million miles beyond the nearest oilcan.

Aside from the scientific surprises, for the moment, what about the Martian environment? Could a souped-up VIKING III really pay off in terms of significant travel

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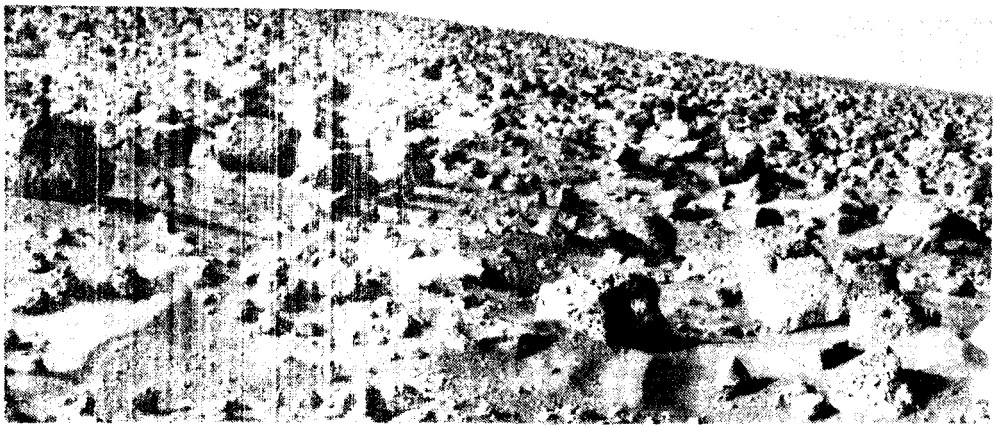

Figure 4. *The rocky Martian plain surrounding Viking II lander, during the local afternoon of 5 September 1976.*

distance over that surface? What about the effect of the environment on the VIKING III Rover, on its survivability? What about the necessity to "build in" reactions to dangerous situations such as sinking into a sand dune or falling into a crater? If you remember the cumulative *three day wait* for the execution of such simple commands as "extend" sent to the present VIKING's sample arm, you can imagine the predicament our would-be VIKING III could find itself in—a sort of interplanetary Brontosaurus, with one brain—the smart one—on Earth, and the other on Mars, with a multi-minute communications lag in between. There are serious paleontologists who believe it was the dumbness and slowness of communication between the main Brontosaurus brain in the tiny head, and the even tinier one located several seconds away, which led to the extinction of the beast. Such delays in analyzing dangers and sending emergency commands across millions of miles at light speed, seem inhibiting, to say the least, for rapid unmanned survey of Mars by use of robot.

(See Louis L. Sutro's article, "MR Robot," Analog, May 1970.)

Here is a world, not merely a corner, but an entire planet, where the last rainfall, the last actual drops of water which could have fallen,

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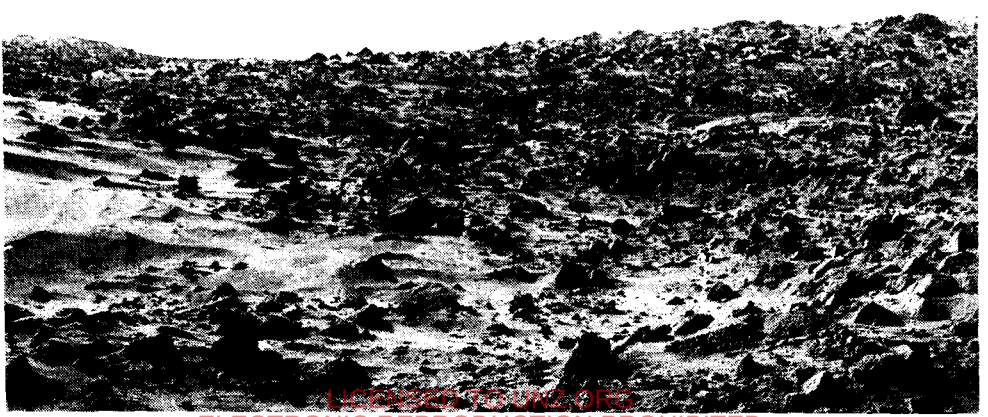
lazily, from a different colored sky in that gentle one-third gravity—that rain may have fallen on the plains which stretch so distantly before the VIKING cameras, one hundred million years ago. (Fig 4)

And, speaking of the sky, that exotic roseate canopy which stretches overhead, remember the predictions before we went to Mars? Remember Chesley Bonestell's classic paintings—a smaller sun set in a deep, blue-black firmament, almost space-black even in the daylight? Now, imagine our astonishment as the first panorama relayed back from Mars, revealed line by line a sky in places *brighter* than the ground! Or, the reaction of most of us who sat through the first news conference late the second night we'd been on Mars, when we hissed—that's right, *hissed*—Jim Pollack for assuring us the sky was not blue, or even black, but pink—a soft, luminous pink, from horizon to horizon!

But, DN numbers do not lie and, in truth, the skies of Mars are truly shades of red. The fascinating question is: Precisely why?

Imagine a place on Earth where it does not, cannot, rain for a thousand million years or more. Imagine winds blowing grains of sand around, each grain hitting rocks and fragmenting, to be carried even farther, now,

Figure 5. *Dune field near Viking I lander, photographed at 7:30 a.m. local time 3 August 1976. Landscape is similar to terrestrial deserts of California and Mexico, such as Death Valley.*



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reduced in mass and size, to hit again and fragment still further. Imagine such a process, uninterrupted by a single drop of water which would cement tiny particles together, proceeding through the centuries: rocks reduced to sand, sand ground down to sifted sand, and sifted sand reduced to dust, swirling clouds and deep accumulating drifts of dust across a wasted world.

The fineness of the grains and the lower atmospheric density of Mars apparently combine to produce a material capable of causing all sorts of interesting problems. For instance, when Dr. Priestley Toulmin III and his team attempted to dump their initial sample from the analytic chamber used for the Inorganic Analysis, they found just how adhesive Martian dust can be. It wouldn't dump. Only by sending of emergency commands to the Lander computer and thereby to the electric solenoid which "rattled the trapdoor" could the chamber eventually be cleaned, partly, of the incredibly adhesive soil of Mars.

My question, as we sat there listening to a rather chagrined VIKING scientist describe his battles with the Martian surface, was: What does this mean for roving vehicles?

It's fine to sit in one place, in practically a dead calm, and relate the petty annoyances such fine, clinging material is causing. But what happens when you try to drive through the stuff, when it rises in a cloud and is blown by the winds back across the Rover, particularly the optics of the cameras, which are crucial to navigating any rover across the surface of Mars. What about the insidious fineness of the material, which is on the order of *molecular* sized particles? What happens when this incredibly fine stuff works itself into every crack, every component, every electronic system? And what about the bearings on the treads or wheels? What happens to bearings ground down by dust so fine that it could enter along any seal or shaft?

And, then, of course, there is the wind.

Soon, as you read this, the VIKINGS on Mars are going to experience the effects of the coming summer dust storms in the Southern Hemisphere. We will be able to tell a lot about the future of unmanned exploration of the planet Mars by what happens after that. One tentative prediction which I have made pertains to those exquisite and photogenic drifts to the northeast of Lander I. Given that the big winds in this area are known to sweep from northeast to southwest, what bets are there that in a few months we will be wishing for a bigger shovel on the end of VIKING's sample arm, to extricate our Lander from the "walking hills" of Mars? (Fig 5)

Let me state my current analysis more clearly:

I have no doubt that, given time and money, *all* of the preceding engineering problems can be addressed and solved. In fact, they must be, if

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we are to follow up in any way on VIKING's wondrous hints of what may lie there on Mars, waiting for us to return. The question is surely not IF unmanned exploration can be made to work, but, should it?

What do we want to know that VIKING hasn't told us and, in fact, probably cannot tell us, no matter how long it survives?

Not just, "Is there life on Mars?" But, "What kind of life?"

That question hasn't been touched. And, just as surely, it cannot ever be satisfactorily answered by the VIKING data. At best, VIKING has only told us that our primitive assumptions in the three experiments were dumber than the Mars they went to look at. Time and time again during the mission, as each new result confounded previous predictions, Drs. Klein, Soffen, Oyama, Horowitz, and Levin—the entire team—kept telling us with increasing certainty that we might not know what VIKING had discovered for years, and maybe never. Because it appears that Mars is more complicated than we could possibly have imagined from the insulated position we hold upon our water world. Thousands of man-hours of laboratory experimentation, with endless soil combinations, atmospheres, radiation levels, ultraviolet light doses, wetness, dryness—in fact, everything but the lower gravity—will probably be duplicated in attempts to simulate, for VIKING instruments on Earth, the strange reactions VIKING reported back from Mars. And after all that, maybe . . . just maybe, we'll have an answer to our most elementary question: Is Mars alive?

Beyond that, VIKING is totally helpless.

The scientific uncertainties and the environmental difficulties I have sketched for rovers on Mars indicate that to do the job properly, both technically and scientifically, will require some order of magnitude improvement in our ability to build and operate unmanned robots on the Martian surface. Which brings us to an interesting point.

How expensive is it to create intelligence equal to the problem of surviving on Mars without significant aid from Earth? An intelligence capable of asking the correct scientific questions of the planet? In other words, what does it cost to invent a truly intelligent machine and equip it with the tools to explore Mars?

And when does this cost become more (and after how many failures?) than the cost of sending men—to do a better job?

Now we've done it: crossed the magic threshold between "reasonable" journalism and "heresy," at least with regard to Martian exploration. It just isn't done these days, talking seriously about manned exploration of Mars. It's so "expensive."

But does it have to be?

One of the disadvantages of trying to convey some of the results of VIKING in an article such as this is

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the problem of emphasis. With such an enormous milestone to describe, such a revolution in perspective to cover, one has to select a point of emphasis. For several reasons I was forced to choose the biological investigations and their confusion. I did this, primarily, because this is where the greatest interest in Mars as a place and as a planet has lain in the past and continues to lie, even now. This is strikingly obvious from the questions network newsmen were putting to the various scientific teams up until the very last news briefing: "From all that VIKING has told us, is Mars alive?" There simply are no other questions insofar as public interest is concerned.

As I have said many times before, major public interest in continued exploration of the solar system received a mortal blow that morning in 1965—the day our first Martian probe, MARINER IV, telemetered back to Earth those unexpected views of a cratered planet Mars. It was the end of an age of dreams and fantasies about a living planet, replaced in one shattering event by the picture of a dead and battered relic, apparently devoid of even the lowliest spark of life, let alone Martians or their wonders.

This was the beginning of the inexorable decline of space exploration, which has led us to this moment—poised upon the last excursions into the unknown mysteries which still await us on Mars and beyond.

But, is the inexorable inevitable?

VIKING, apart from the biology, has revealed a world dazzling in its scientific and romantic potential; and it is through VIKING's new information, *all of it*, not just the ambiguous biology, that I propose a plan to save, not just future exploration of Mars but, as I said in my Analog piece of 1974, the entire space effort.

Let us return to the point where I was questioning the eventual expense of smart machines to explore Mars (or any other planetary surface, for that matter).

The standard rationale for preferring such mechanical explorers is: (a) their relative economy, and (b) their expendability. All right, let's examine our first assumption: that unmanned exploration of Mars is consistently cheaper than going there ourselves.

The biggest criterion has been mass. Plain tonnage of material. If you send an expedition of people—explorers—they have to carry with them sufficient oxygen to breathe, water to drink, food to eat, ships to travel in, electronics to communicate, fuel to propel them, engines to accelerate and decelerate, landing modules to descend from Martian orbit, more fuel to reascend to the waiting mothership, more fuel to start them home, and more fuel to brake them into an orbit around Earth once they come back. I've left out a lot of items.

It *has* to be a big expedition because each human being requires at least 8 pounds of water and

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SAIL SIZE (Meters)	MERCURY TRIP		VENUS TRIP		MARS TRIP	
	One Way Transit Time (Days)	Pay-load (Metric Tons)	One Way Transit Time (Days)	Pay-load (Metric Tons)	One Way Transit Time (Days)	Pay-load (Metric Tons)
800	600	8.3	200	1.8	400	2.3
(IPS)	900	17	270	6.8	500	5.1
	1500	42			700	7.8
2000	600	68	200	14	350	6.4
(manned?)	900	135	270	55	400	15
	1500	340			450	25
					500	32

TABLE 1. INNER PLANETS PAYLOADS AND TRIP TIMES

oxygen per day, not to mention about 1.5 pounds of food. Multiply by the number of persons on the expedition and figure the mass for a minimum round trip to Mars of at least 900 days. Now, calculate the amount of fuel and oxidizer required for the various accelerations out to Mars, decelerations into orbit, descent to the surface, ascent, etc., remembering that typical mass ratios of chemical rocket systems are in the range of 100 to 1. And, after you've done all that, begin to examine the technical design requirements of building these ships, storing that amount of fuel and producing rocket engines of the required size and reliability. Yet, we have not begun to mention the major support requirements of a surface exploration of Mars itself.

It begins to appear that the critics are right. Sending men all the way to Mars in the comfort to which four million years of evolution has accustomed them, seems to be rapidly getting out of hand!

What I have just sketched very broadly is the classical approach to a Martian expedition, first conceived in reasonable technical detail by none other than Wernher von Braun, and illustrated by Chesley Bonestell precisely twenty years before VIKING, in 1956. The book was entitled *The Exploration of Mars* and depicted a fleet sent to explore the Red Planet, using hydrazine-clustered rockets for the initial launch and large-winged ships for the descent to Mars. If such an expedition could be delineated then is it not reasonable to assume that, a generation later (after the technical revolution we have undergone because of twenty years of exploring space) we might be able to take a few shortcuts through that classical approach, thereby cutting costs, heightening the return, and, maybe–just maybe–opening up the

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GAS EXCHANGE EXPERIMENT

- Oxygen is rapidly liberated when Martian soil comes into contact with water
- Extended incubation in the presence of organic nutrients resulted in a slow, steady evolution of carbon dioxide
- No gas changes attributable to living systems have been seen

LABELED RELEASE EXPERIMENT

- A rapid decomposition of added organic nutrients was observed in all samples tested
- Heat sterilization destroys the capacity of Martian samples to carry out this decomposition

PYROLYTIC RELEASE EXPERIMENT

- Small amounts of organic material were synthesized from carbon monoxide-carbon dioxide gas mixtures
- This synthesis proceeds best in the light and is inhibited by water and by heat sterilization

TABLE 2. ESSENTIAL FINDINGS IN VIKING BIOLOGICAL INVESTIGATION

solar system to new mechanisms of exploration?

What technical advances have our twenty years and one hundred billion dollar investment in space technology brought us?

Let's start with the same problem we mentioned a moment ago—mass. Those precious twenty years have seen two electronic revolutions—the transistor and the integrated circuit. The Analog audience is well versed in what that means in terms of weight, power, and reliability. Since the development of such systems has been paid for (and development is the expensive part of spaceflight), electronics, navigation, computation, and communication technology can be considered off-the-shelf technology, by and large, and is thus almost purchasable at the going rate. This means millions instead of billions for such components.

Now, a little philosophy. Most studies of expeditions to Mars have assumed a "closed-loop ecology"—environmental engineering which recycles almost everything because each extra pound of oxygen is expensive in terms of all the fuel needed to accelerate and decelerate many times, and just plain scarce along the way. But what happens if you, for whatever aberrant reason (I'll get into why in a moment), decide to

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scrap the closed-loop idea? It means that our previous twenty years' experience in building manned spacecraft environments, from MERCURY through APOLLO and SKYLAB, to the Shuttle and SPACELAB, immediately become applicable. Their technology, again purchased over the previous twenty years of spaceflight, already exists. It's merely (!) a matter of reassembling it into a specific system designed to go to Mars. The only price you must pay becomes the cost of the consumables you use, since none of these systems is anything close to a "closed-loop system." But water, oxygen, and even food, is cheap. The real corner you've painted yourself into is the cost of the rocket system required to haul the mass of these consumables out to Mars and back.

This was the real key for going to Mars. The rocket. How to design a fleet of ships, carrying the men and equipment necessary to explore Mars in sufficient detail beyond that of unmanned systems, in order to justify the enormous developmental effort. The critical piece in this puzzle is the transportation. Such a fleet is simply very expensive—first to develop, then to build. And we still have not mentioned the technical requirements of life-support, mobility, and exploration on Mars once you get there.

What we need is a breakthrough. And that's precisely what we've got.

The answer is not a fleet of rockets, but a fleet of sailing ships!

NASA wants to, and believes it knows precisely how to, build a vast, gossamer ship of spars and wires and aluminized plastic which would be launched by the Space Shuttle, erected by men, to unfold its enormous dimensions in earth orbit. Such a creation, child of science fiction stretching back through Arthur C. Clarke and others, would literally hand Man the solar system on a silvery platter —a Solar Sailing Ship. (Fig. 6)

With a fleet of these true denizens of interplanetary space, ships measuring miles across, Man would become the inheritor of the Sun, riding the beams of an almost limitless radiant energy which streams forever into interstellar space as sunlight. The second era of the sailing ship would dawn upon an ocean of infinity.

The mass of a solar sailing ship, according to very active technical studies currently being pursued by NASA, is so small in comparison to its area that development is only in the hundred million dollar range. Scaling is elemental, after initial tests and construction of prototypes. A fleet is almost as cheap as an initial vessel.

Thus, the Age of Sail returns.

Using the Sail, one can now envision several dramatic cost reductions over the classical Mars expedition. No large rockets. No enormous development effort for closed-loop ecologies. Mass, suddenly, for the first time in spaceflight, becomes a

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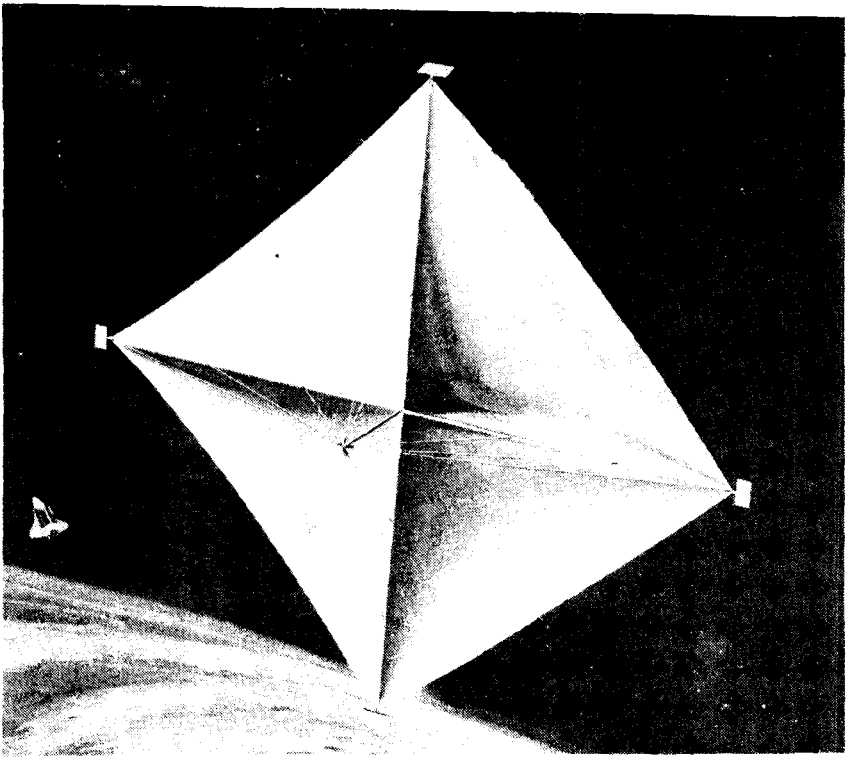

Figure 6. *The beginning of the Second Age of Sail: artist's concept of a solar sail vessel, deployed by a Space Shuttle.*

manageable commodity. And cost trade-offs, between costly miniaturized space-versions and familiar terrestrial items, can take a back seat to available and vastly cheaper off-the-shelf systems.

But what about Mars?

Getting there, to paraphrase an old saw, is only half of it.

The other half of the breakthrough vis-à-vis Mars was handed to us the morning (afternoon, on Mars) VIKING I landed. During entry into the Martian atmosphere, VIKING sampled and flashed to Earth for the first time, a complete *in situ* examination of exactly what the atmosphere of Mars contains. Later, the VIKING Landers repeated this vital investigation on the surface. Their results are not only fascinating scientifically—they will make it possible to explore Mars with people for a fraction of the costs estimated before VIKING.

Because everything we need to live on Mars is, essentially, awaiting us in almost unlimited supply!

Before VIKING, the only certain constituent known to be available in any great amount within the Martian atmosphere was carbon dioxide. And even that was only present at a

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surface pressure *one two-hundredth* that of Earth. Imagine my personal delight when VIKING entry scientist Mike MacElroy announced that the atmosphere of Mars contains between five-tenths and one percent oxygen, between two and three percent nitrogen, and that the permafrost layer all over the planet may extend to a depth of almost two miles! Later, the Orbiters revealed that the poles, those frosty white patches which have so intrigued generations of scientists since Lowell are, in reality, vast stores of ice, enormous reservoirs of water, awaiting only energy for its liberation and use by Man or Martian. (Fig. 7)

It is thus apparent that the critical commodities for living on Mars are already there! A compressor to pressurize the atmosphere would make available unlimited quantities of oxygen, nitrogen, carbon dioxide. And a means of melting the glaciated ice we now know Mars possesses in abundance, would assure limitless supplies of water.

An expedition to Mars could "live off the land" in perfect confidence. But there is more.

After the Solar Sailing Ships had delivered the Expedition into Mars orbit, some mechanism of transportation between the surface and the orbiting supply base would be essential. A version of the Lunar Module, designed to land on Mars, would be a major development effort. But, powered by liquid hydrogen/liquid oxygen rocket technology similar to designs for an advanced single-stage to orbit Shuttle, such a Mars Shuttle could *refuel* repeatedly, using electrolycized H_2 and O_2 made from the abundant water available beneath the surface.

A nuclear system, essentially developed through the SNAP program, would supply the necessary energy to power the Mars base, electrolycize water into hydrogen and oxygen, run air compressors, provide heat and light, and generally make such a concept possible.

Even mobility is relatively easy. Modifications of existing tractor designs would probably suffice. Some form of supercharger might be suitable for the engines. If not, then tanks of oxygen and fuel could feed diesels. Then again, electric transportation powered by fuel-cell technology already existent might be preferable because of the contamination problem, the limit of diesel fuel, and an abundance of electricity. (Fig. 8)

In other words, VIKING has replaced the concept of a Martian expedition patterned on the Lunar model with one more resembling the activities of Admiral Byrd, Amundsen, and Scott. Exploring Mars is much closer to an Antarctic expedition than any other analog, even to the likely locale for Mars Base I—one of the Martian Polar Caps, amid all that frozen water.

And so, at last, to the utility of men (and women) over machines in the quest for the answers to the Martian mysteries.

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All of the environmental problems previously presented would undoubtedly exist for men, as well, and several additional varieties that would not affect an unmanned robot. The difference is the men.

Dust? Imagine the simplicity of one man and one rag, for cleaning vital windows, camera lenses, and radiative surfaces, as opposed to the Rube Goldbergian designs of reticulated arms, pyrotechnic windows, and puffs of CO_2 sprayed from "clogg-able" plumbing. Picture some swearing, disgusted member of such an expedition laboriously cleaning out the bearing housing of some Martian "Cat," before the next day's foray across the silent hills. But, also, picture those bearings lasting far longer and at a much cheaper investment than for some hypothetical counterpart on some Martian Rover sent expensively from Earth to manage with the dust, alone.

It was in SKYLAB that the utility of astronauts as unspecialized repairmen came of age. SKYLAB was a system designed, practically, for a "hands-off, it-will-always-work" philosophy; but, from the beginning, with makeshift pruning shears for cutting sticky solar panels, and hammer blows on sealed "black boxes," each successive crew kept SKYLAB

Figure 7. *High-resolution photographs from Viking II orbiter of Mars' north polar cap, which consists of water—not carbon dioxide—ice.*

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alive long after its own automated systems would have sent Houston a coded "In Memoriam."

There is a profound lesson in these past experiences which stretch even to the lunar surface, including home-made fenders for a Lunar Rover constructed out of flight plans on the spot. It is not merely confined to maintaining the life-support technology or the communications link with Earth. I believe that Man belongs on Mars because it is the only way the most important scientific questions will ever have an answer.

Compared to the total scientific instrumentation of 145 pounds VIKING landed on Mars, a manned expedition, via Solar Sail, could easily transport a thousand times that much. But, far more important than sheer mass of chemicals, spectrometers, chromatographs, electron probes, or nuclear measuring devices, is the ability, essentially absent from robot instrumentation, to change the experiment. And equally important, to make fresh decisions about what to experiment on.

Man is a visual animal. A flash of color, a suspicious movement, a sense of something "out of place," all these combine to produce a creature of extraordinary selectivity when operating in unknown terrain. Could any reasonable unmanned system have spotted the famous "orange soil" at Shorty Crater on the Moon, at any of the projected band widths and processing speeds of digital television information one could expect from any robot rover? And how about the single most important scientific find of APOLLO 15, the eight foot lunar core made at Hadley Rill? It took two muscular astronauts, a lot of sweat, and practically a direct refusal to Houston, but Dave Scott removed the drill, stuck with its precious cores in the lunar surface, and managed to stow the eight-foot sections somewhere in the Lunar Module for return to Earth. There, those cores revealed at least a billion years of lunar history, successive events of volcanism, lava flooding, and meteoric impact—an invaluable cross section of the past—which would have stayed a secret except for one determined man with the time to try again.

But these exploits pale beside the sheer complexities facing any reasonable biological examination of the planet Mars.

At some point during the VIKING mission, Hal Klein said something which was actually very revealing, but not, perhaps, in the way he meant it. And, naturally, no newsmen picked up on it vis-à-vis robot sentiment, which at the time was growing like the proverbial mushroom. Klein remarked that we (meaning the press) shouldn't be surprised at the confusion over whether VIKING was telling us about Martian chemistry or biology. It had taken, he said, 200 years from the time of the first microscopic views of bacteria until the controversy over whether they were inanimate

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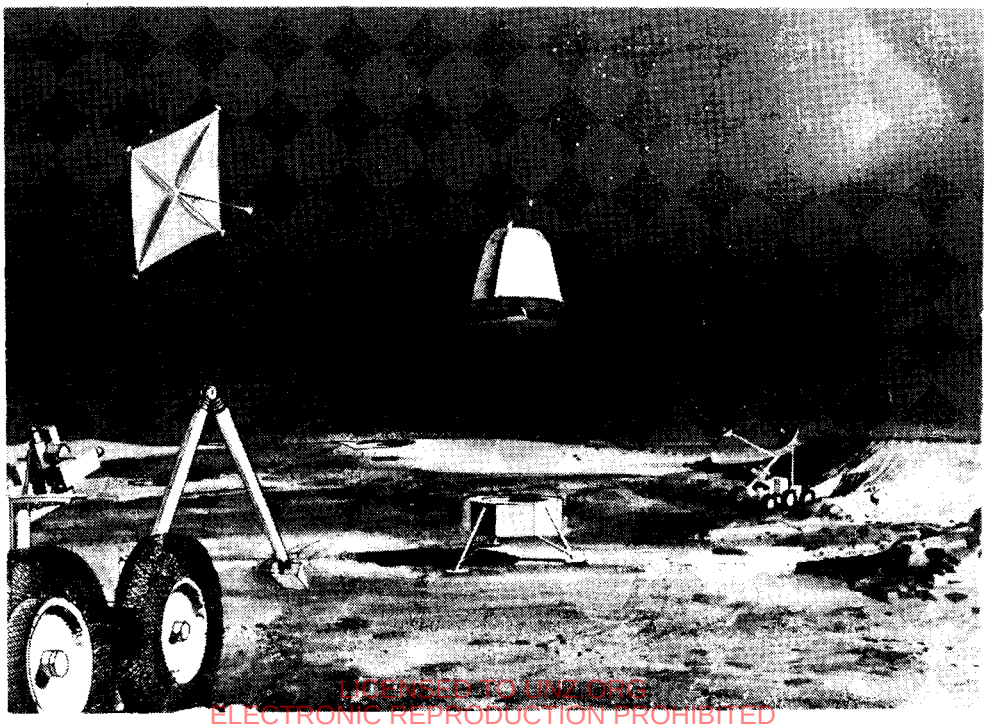
chemical systems or living things was totally resolved. Two hundred years. With ever more sophisticated instruments, unlimited samples available to scientists, and complete freedom to experiment.

One might point out that those two centuries stretched from the middle 1600s to the middle 1800s, during the growth period of all Western Science. But, suppose the biology on Mars is truly alien? Suppose VIKING has been trying to communicate a critical link between the science that we know and . . . what? I can't help thinking that we are standing at the dawn of some equivalent learning process with regard to possible Martians and their exotic biochemistry. And with robots programmed to look for earthly life, when will we know for sure? Two hundred years would take us nicely into the Star Trek Era, where handling "new life" is, of course, a matter of routine.

Klein pointed out one other thing which cast a telling shadow over backers of the "smart machine" approach. Approximately coincident with VIKING, a mysterious and fatal illness struck twenty-nine Legionnaires staying at a hotel in Philadelphia. Shock and hesitation gave way to a crash medical alert. Major resources of local, state, and federal research facilities, including the Cen-

Figure 8. *Artist's rendition of Mars expedition returning soil samples to main analysis instrumentation in orbit around Mars, aboard to solar sail vehicle.*



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ter for Disease Control in Atlanta, were mobilized to find the cause of this strange and aberrant disease.

With unlimited resources, the most sophisticated analytical techniques, a number of victims for analysis, it took many months for the combined medical opinion of the entire United States' medical establishment to even partially discover the cause of the disease—a very rare bacterium. And this occurred on planet Earth, in the midst of the most developed medical technology extant, at the precise instant Man was reaching out to determine if Mars was, indeed, alive. The lesson to be drawn with regard to easy, automated answers to an alien biochemistry is obvious.

In many ways, the scientists who would like to have those answers have cut the shirt to fit an imaginary cloth. Scientists, I believe, argue persuasively for robots, not because of an inherent belief that the answers are extractable through such automated instruments, but because they have been beaten into the position of believing those are the only toys the public will allow.

They are guilt-ridden, these would-be explorers of the solar system. I do believe that many, deep down, are hard-pressed to explain even to themselves why determining the past history of Mars and the presence or absence of life there is as important to the future of mankind as, say, our pressing social needs. It is because they, too, have fallen into the morass of viewing these expenditures as "sinks"—bottomless wells in which gravely needed funds are "thrown away!" Some, while allowing that a certain level of expenditure in these directions is proper, feel that the sums needed for *manned* exploration are "unconscionable" in view of other pressing problems.

But how much is "too much?" And when will we address the real issue of this apparent dichotomy—that space expenditure, contrary to certain public and scientific perceptions, is not money "thrown away," but money invested in the only real source of added wealth—new knowledge.

Which brings us to the title of this piece. It should not have passed without notice that the summer of '76, besides being immortalized as the moment we first set footpad on Mars, will be remembered as the watershed of something else—the time when a group of space enthusiasts collectively decided to make its voice heard in official circles. This vanguard, under the unlikely heading of "Star Trek fandom," inundated the Office of the President with approximately 100,000 letters, asking that the first space shuttle receive a name in keeping both with its potential and our national tradition. The President, over NASA's indifference, responded to the expressed wish of this group, marking the first time a space constituency had collectively assembled to request something of its government—and had been heard.

Thus it came about that the first proud ship of a new line was chris-

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tened ENTERPRISE. The meaning should be clear.

Star Trek fans in the United States number at least 25 million. If even ten percent actively lobby for a resurgence in the nation's space activity, their citizen perspective—as opposed to the vested interest of the industries of aerospace—can have enormous weight in determining where we go next, and when. This "new dimension" of citizen support could be particularly crucial at this juncture in our history, a sort of "interregnum" between the end of the first exploratory guests across this other ocean and the arrival of the Second Age of Space.

NASA's initial twenty years are coming to an end; the programs to reach out across the solar system spawned in our first flush of excitement are almost exhausted. In their place is—nothing. There are *no new programs* to follow-up on what we have discovered, no "second-generation" systems to improve upon the MARINERS, the PIONEERS, or VIKING. There is only the shuttle ENTERPRISE and her four sister ships, an open question as to what we should do next (*if* we do anything)—and a new Administration.

Could it, therefore, be the perfect time to propose a new beginning?

NASA's primary failing (beside the consistent problem of communicating the importance of its discoveries) has been its mission-oriented nature. The quest for space has moved almost spasmodically across new transportation systems (Redstone, Saturn, Titan, and the Shuttle), and focused these resources all too narrowly upon each new objective. (A first satellite, the Moon, Mars, or earthly "applications.") It is an extremely vital question, therefore, at this juncture, whether we continue in this tradition born of the political realities of the sixties, or go on to something more mature. Should we, in fact, be more concerned with Mars as the next all-out objective, or should we view the question of how and when we follow up on VIKING as perhaps a spur to the entire quandary posed by NASA and its approach to Space?

I would like to advocate the following: what if we consider space, after almost twenty years of pioneering, poking and probing, as a truly new environment, a place like the western frontier or the interior of Australia? What would be the resulting public consciousness if we elevated space exploration and development to the level of a *cabinet position*, equally important to the Nation's future as such long-established entities as Agriculture, Interior, Housing and Urban Development, or Transportation? What if we created the Department of Extraterrestrial Resources under which all exploration and development of space could be coordinated as part of a national strategy for increasing the quality of life in the future?

A detailed vision of what this would entail is not necessary here.

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Suffice to say, it would elevate space from ten sporadic missions of the past to a political reality, an important new environment to be explored and utilized for its unique potential. It would go a long way toward "institutionalizing" this arena the way "Labor" has institutionalized an important segment of the American electorate, and "Defense" consolidated the entire spectrum of military operations. It would say very emphatically, "Space is here to stay."

Under Cabinet authority (as opposed to agency aegis) a return to Mars or any other specific objective would take on a new level of meaning, equal to the objectives of State, HEW, etc., in the fulfillment of national policy. Just as farmers have Agriculture to voice their opinions, so space-supporters would have a political representation at the highest level, a department which could, unlike NASA, coordinate industry and citizen involvement in future efforts to develop the resources of the solar system. And, most important, such Executive Authority could insure a more even-handed treatment of long-range plans—without which, as with VIKING, we will inevitably once again stand on the threshold of fundamental new discoveries and have no means of follow-up.

How then would a Department of Extraterrestrial Resources conduct a Martian Expedition? And equally important, how would such an expedition advance other extraterrestrial objectives?

Fundamental to resolving the fascinating questions posed by VIKING is our return to Mars with both men and machines. We have essentially another Orbiter and Lander available for use in 1981. Let's use them—just as they are! By that I mean let's *not* equip these VIKING duplicates with expensive and probably useless biological experiments, extensions of the sort we heard about at JPL—carousels of reagents, more chemicals etc. All these, as was the case with VIKING's initial biological investigations, are just as likely to uncover new ambiguities, as well as being expensive and possibly time-consuming technical developments. Instead, let us go ahead with one of the good mobility designs that have been developed, adding treads or wheels. And let us modify the camera system so that it doesn't take hours to secure a reasonable panorama of the location of the Lander. And, maybe most important, let us add (for the price of a paltry 15 million dollars) a pattern recognition gadget already developed by Martin-Marietta, prime contractor for the Lander, which will enable it to land in dangerous but interesting terrain.

Then, let us send this modified Lander to one of the Martian Polar Caps.

If we adopt the philosophy that this VIKING expedition is a meaningful reconnaissance for manned expeditions soon to follow, and maximize the information to be returned accordingly, then I believe

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that VIKING III makes sense. There is still a lot that we must know of Mars before we can realistically consider mounting a manned expedition.

While this activity was underway, which would serve to sustain interest in Mars as well as scouting the most probable locations of potential landing sites for men, other developments could be proceeding which would naturally dovetail into a Master Plan for going back to Mars with a full scientific team. Prime among these would be the transportation system.

NASA's plans for the Solar Sail are pegged to an all-up test flight beginning in January 1982. The plan is for the initial full-sized Sail (800 meters on a side) to carry one of those redundant MARINERS on a chase-and-rendezvous with Halley's Comet in 1985. (See the September 1975 Analog.) Dr. Bruce Murray (Director JPL, origination center for the Sail) believes this would be a sufficiently difficult mission to fully test the concept of the Sail for later use on other missions. It would entail, among other things, approaching the Sun to within a third of an Astronomical Unit, a series of complicated navigational operations, and almost five years' exposure to the worst sun and space could do to this enormous area of plastic.

Launched by the ENTERPRISE, the Halley Comet Mission would also serve to focus attention on another space objective useful to a long-term future in the solar system—the unlimited resources comets harbor. But that, too, is another story.

Thus, in 1982, two milestones would occur: an improved robot mission back to Mars and the maiden voyage of the first ship of the new fleet, a prototype of later ships which would carry men to Martian frozen shores.

It is not necessary to await the results of the Halley Mission to construct a Martian Fleet. Because of the demands of Halley's Comet (it orbits retrograde to us around the Sun!) the Halley Sail must approach very close to Sol and remain there several years. Such a requirement is not needed on a trip to Mars, where one is, of necessity, moving away from the Sun.

The Halley Sail, as NASA envisions, would be launched and deployed out of the ENTERPRISE payload by automation. But, the 2000-meter Sails envisioned for manned flight to Mars would require *men* to spread their enormous area to Space. It seems likely that a coordinated program which realizes the necessity of much larger Sails, and soon, will early take advantage of the enormous flexibility of men-in-space to develop and deploy even its initial "Yankee Clipper." Thus it is not unrealistic to predict that by the mid-eighties both the means and the necessary information will exist to send Man to Mars—at last.

NASA's semi-secret dream entails

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seven to ten Sails of the 2000 meter variety, each with a payload capacity of over thirty tons, for a 500-day one-way flight to Mars. The Hoagland Variation foresees much bigger Sails, and around *3000 tons* total expedition mass. I will explain the difference in a moment.

A unique advantage of the Sail over all prior systems is the essential abolition of the launch-window. Riding on the continuous thrust of sunlight, the Sail accelerates to a point (not midway, as the thrust due to radiation pressure decreases with the inverse square of the distance from the Sun) then decelerates to match velocities with Mars. It does the latter by changing the angle of reflection, so the thrust acts against the orbital momentum vector of the Sail. This is similar to tacking . . . from another ocean and another time.

Once in Martian orbit, supplies, a prefab base, roving vehicles, a power plant, and scientific instruments would be de-orbited automatically all to arrive at a pre-established Landing Site.

For the men are still on Earth!

NASA sees in the Sail the potential for a sort of unmanned wagon train to Mars, one which would take all the necessities for keeping Man alive on the Red Planet, there, ahead of him. Only after all the gear has safely made it to the surface, with transponders operating, the lights invitingly turned on and the proverbial fireplace carefully lit, will men drop in to rough it on this new world.

Trust NASA to automate a Manned Mars Expedition!

Therefore, on to the Hoagland Variation.

Suppose, just for argument, we discover that men are somewhat useful in erecting these far-our Sailing Ships in orbit. What is the limit? For automated deployment, the complexities of springs and rods, tortion-stringers and momentum-dampers to insure that your Sail becomes a butterfly instead of writhing ball of steel wool, are obvious. And, at some point, the complexity breaks down.

But, suppose you assemble truly gargantuan Sails, *one segment at a time*, ferrying each segment—spars, rigging, and the sail itself—aloft by Shuttle, using men in the construction. What are the limits then?

Why not Sails 20,000 meters on a side? After you've got a system, why not? Well, mass for one thing.

NASA's initial Sail design calls for a unit mass of only 7.5 grams per meter square, counting both payload and the Sail. That's spars, rigging, booms, plastic (and its aluminum coating) and the spacecraft it will carry to its rendezvous with Halley. But even the meager "Yankee Clipper" Sail, as NASA would like to call it (I prefer "Flying Cloud," myself) would have an area of over 640,000 meters square with a mass of about 2000 kilograms. That's only the plastic (with its metal coating).

A 20,000-meter Sail would need,

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say, 625 times the plastic alone. Or, about 1.3 million kg. of sail. That's 43 trips of the ENTERPRISE upstairs to carry just the spools of plastic. Assuming the worst-case economics of $880 per kg. to Earth orbit, that would eat up $1.1 billion for one sail. If you add the required flights to carry booms, rigging, and control lines, the total is about $1.8 billion per completed vessel, not counting development costs or construction fees of the engineers who erect this unprecedented fleet.

Each ship could carry a conservative 300 tons to Mars! And, if you recall that the entire mass of the first scientific outpost explored at our South Pole was around 700 tons (and a lot of that was diesel fuel for the generators), the philosophy I'm advocating becomes a little clearer.

Sails are big dumb structures erected in an environment where, barring some "Wrongway Corrigan" who drives one into a planetary atmosphere, they are immortal. They will provide cheap dependable and fundamental transportation of things around the solar system. They are much more akin to surface ocean transportation on Earth (slow but sure and quite inexpensive) than their more lately arrived competitors upon Earth, the jumbo jets.

Figure 9. *The frozen wastes of Mars. Argyre Planitia, as seen by Viking Orbiter 1. The horizon is 19,000 kilometers away.*

The key to the economies of Solar Sailing lie in scale: the bigger the better, up to a point. I propose that we use that unique advantage space has over any other environment we've ever dealt with—lack of gravity—and build them huge, and as soon as possible.

With a fleet of ten of these gargantuan devices, an expedition massing around 3000 tons becomes a practicability. Three thousand tons! With mass like that, off-the-shelf equipment, ample spares, modified versions of familiar items (far less expensive than specially pedigreed versions developed uniquely for the Mission) becomes totally conceivable. And each pound which doesn't have to be specifically developed for the Mission is a saving of untold millions in the final cost.

Lest any doubt the wisdom of investing twenty billion dollars in plastic and aluminum, consider this: such a sailing fleet with its incredible capacity could make possible any future expeditions, essentially anywhere, across the solar system, from its construction date onward—without limit. And each ton of "dumb" payload mass the Fleet could carry in the form of existing hardware would represent enormous saving overall.

My proposal, somewhat cavalierly calculated, is that using this technique a Manned Flight to Mars and return could be mounted for around fifty billion dollars. Figures of 100 to 200 billion which have been quoted by the networks are patently absurd.

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Even O'Neill's plans for 10,000 people permanently in space, NASA estimates, would cost around 200 billion, and that would require infinitely more development than the Hoagland Variation of an expedition to Mars. Even NASA's semi-secret hope, the 2000-meter Sail Mars Expedition, could come in much cheaper than traditional pre-Sail estimates.

Because the Sails are uniquely suited to the scale of space itself and, once developed, are elegant in their simplicity and cost, they will make excellent initial object lessons in the art of large-scale space construction. Many future developmental efforts at tapping the resources of the solar system will depend on how early and how easily Man masters the technique of thinking big in space: Satellite Solar Power Stations, space-based radio telescopes and other astronomical equipment, space manufacturing facilities and, someday, O'Neill's constructed mini-worlds, each tens of miles across. Making Sails is an early start on all of these.

Thus could a Department of Extraterrestrial Resources with its exploratory eye on Mars and from a base of broad technology and expertise, insure that when we need the myriad resources awaiting us out there we will have the means to harvest them. It is this spur to a coordinated program for returning to Mars that I believe offers the biggest reason (beside the scientific) for going back, and soon.

And what is waiting for us there? That has waited patiently across the centuries as men have gazed upon its reddish-tainted tint? That has waited so much longer than even men have known of Mars, or war, since before an upright biped dared to throw defiance at the sky? Has waited longer, perhaps, than the drift of continents across a bluish planet closer to the Sun?

Imagine a world starting out with a plenitude of everything: water, nitrogen, carbon dioxide—a parallel of Earth in almost every way. But, a world of lesser gravity, farther from the warmth-giving center-star, a world evolving faster than Earth.

Imagine this small rapidly spinning, increasingly more desperate place; a speck of solar debris devoid of the protective fields of magnetism, a mote of thinning atmosphere and creeping cold, as the iciness of interplanetary space crept down upon the growing deserts and the air was swept away by the breath of Sol itself. (Fig. 9)

In that environment of frozen oceans, endless miles of permafrost and sand, unshielded from the cosmic rain of nuclei that sleet across the night from unfathomable distances, and driven by the thirst and cold of unceasing eons without a drop of rain—what happened to the spark called Life?

Every fact, every scrap of evidence VIKING spat across the solar system told of a time when every factor,

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every facet of this ancient Martian chronicle had been essentially identical to processes theorized for Earth. All the ingredients were there (VIKING kept repeating) and time, even in the face of the inexorable loss of warmth and atmosphere, must still have been enough to synthesize across the megayears what scientists on Earth had synthesized in days—essential preorganic molecules, and from these, a multiplicity of acids, including those with amine in their makeup.

Even the spindrift of the birth throes of our star, the meteoric fragments which endlessly sail through cold eternity exposed to radiation and reality of space, contain preserved organic memories of their environment of birth.

But on Mars . . .

The paradox of an unblemished and unceasing new sterility—a world cleaner than the Mars that once must have run with streams (Fig. 10) and thrown fleecy clouds across a distant sun . . . VIKING reported no organics, either from biology or that found even in the heart of the scattered dust of space, the trace components of a yesteryear of genesis. Where had they gone? And, if the whisper of activity measured in the VIKING Biology Experiment was truly life,

Figure 10. *Was there water on Mars? A planet-wide flood? If so, it must have happened three billion years ago.*

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then where was the required residue, the organic refuse which living things on Earth leave to mark their passing, from beagles to bacteria?

That was the crucial difference. We, and VIKING, were no longer searching Earth for life, but we had come to Mars. And Mars had had four billion years of separate history to play the game its own way.

There had been stories, I remembered, as new graphs and diagrams appeared before us daily on the screens at JPL, of worlds beneath older, cooler, more ancient suns across the Galaxy. Anderson, in Analog, had done one, perhaps most recently, where the gently banked fires of a dim red-dwarf barely warmed a distant, ancient world. Where life, in the form of exotic crystals, or unfathomable pattern in the rock itself, clung tenuously to time, measuring its flow by a different clock from the frantic pace of The Invaders, barely conscious, in the constant twilight and unceasing cold, of their presence, so slowly did thought and chemistry proceed in such a world.

And I remember wondering, what if life like that could in reality exist, not on some nameless planet halfway across the Galaxy, but here—on Mars? And if we found it, a barely recognizable congruency with our teeming, frantic form, a chemistry evolved far beyond our own, far more efficient, infinitely more patient, more careful of every stray element it needed across the endless days and nights between the rains . . . would it not resemble the confused results our robot was sending even now, its *sophisticated* presence baffling the crude assumptions inherent in the VIKING hardware?

VIKING revealed a Mars that started its existence essentially a twin of Earth—and then aged rapidly into a "worn and wasted world" (to quote Jon Eberhart). If life did begin, that moment of the Martian dawn, then the moment came and went with frightening rapidity, and the sunset years, the inexorable decline of everything across the twilight of suspended youth and premature old age was but a beginning for everything Mars would experience until the end of time.

Under those conditions, savagely driven by a planet sliding into the nightfall of eternity, life, if it did exist, would be forced to evolve faster than its world—or die.

From what we know of life as the phenomenon which celebrates its mere existence by filling every available environment, even to the seething cores of nuclear reactors, what would such a planetary pressure produce across the eons? For, remember: if life arose on Mars it started early when essentials were abundant, perhaps much earlier than here on Earth. And Mars was the much more desperate teacher.

Given this, I wonder what other "impossible" surprises do the sands of Mars conceal? Do we have the courage to find out? ■

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vector analysis

Jack C. Haldeman II

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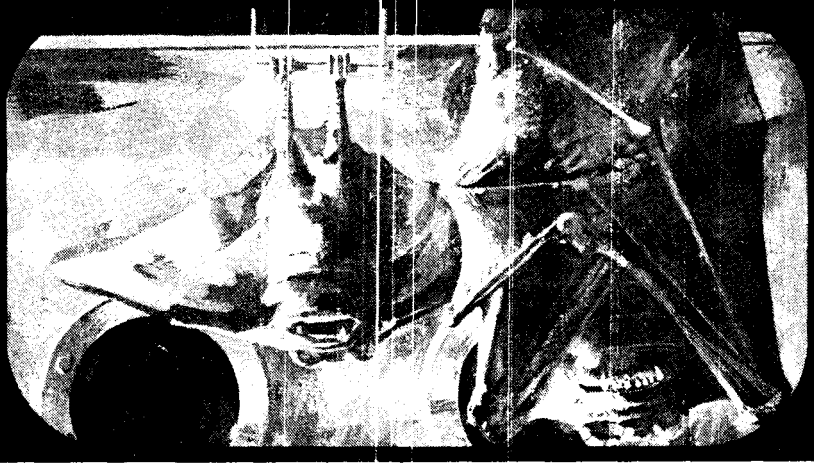
An Orbital laboratory is a good place for experiments in which variables must be carefully controlled. Too good, in fact.



They came from a windswept world of mystery and death. Slow death, sudden death. On their native planet they swam the high winds, living and dying like the majestic lords of the sky they were. On Delta III they were simply objects of curiosity and scientific study. They would no longer fly the free breeze, feel the humid spray of sudden showers. They were prisoners of isolation. Prisoners of man.

Rob McGregor watched them through a small porthole of tempered glass. *Mantas*, a touch of pterodactyl. They looked more like manta rays from Earth than anything else. But on their world they coasted the thermals, the breezes, the storms. Although they had a span of about twelve meters, they weighed less than ninety kilograms. Their bones were hollow reeds, their skin tough, lightweight. They were considered to be roughly as intelligent as falcons. As he watched the mated pair, they hung upside down in their large cubicle like bats. He wondered if they had parasites and if they did whether he would recognize them. So alien.

Rob was new to Delta III, just off the last shuttle. Everything was strange to him, the mantas were only part of the picture; a part that didn't directly concern him. He had been shuttled up to work on the last part of his PhD research project. Delta III, the newest of the fourth generation orbiting stations, had been especially designed for biological and medical research.

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He worked on shistosomes, small parasites that lived in the bloodstream of man. The intermediate host of his parasite was a common snail. With the extensive irrigation of the Sahara desert, the snail population had increased, the problem had mushroomed. In certain portions of the world it reached epidemic proportions and Rob was just one of many who were working on it.

On Delta III Rob would be able to study these organisms in a way not possible on Earth. Here he could control almost every conceivable factor: gravity, heat, light, atmosphere. Maybe the answer would be there, maybe only new data added to the growing bank of scientific knowledge. He had designed his experimental protocol carefully. It could be carried out nowhere else but Delta III. The fact that Linda was on a year's tour here hadn't entered into it at all.

The male manta unfolded one huge wing and regarded Rob with a multifaceted eye that seemed to glow like a cold green jewel.

Captain Riggs shifted slightly in his formfitted chair, tapping buttons set in the ends of the armrests by his fingertips. The screens in front of him flickered, blinked. It was all rote, automatic. He sat at the nerve center of Delta III, sorting out the complex array of readouts and vidscreens into one smooth flowing unit. He sensed, as much as read, the patterns that they traced; patterns that monitored every aspect of the station. Intuitively, he could tell if anything was even marginally wrong by bumps in the pattern, usually before the actual causes flashed on the board. Today there were no real bumps, everything was smooth. He sensed a movement behind his back.

That would be Brown, second in command. He was two and a half minutes early. Riggs acknowledged his premature presence with a curt nod of his head, never taking his eyes off the screens, the dials. He flashed an end of shift update to Delta II where it would be stored.

He felt Brown ease into his chair, felt it hum into life. Brown was duplicating his actions, getting into sync with the flow of data. Riggs punched a pattern on the center screen. Brown matched it nearly instantaneously. They were linked. Riggs felt his controls go dead as his seat swiveled away from the board and Brown's slid into place. He mentally shifted gears. He was off duty. As off duty as a commander could ever be with the responsibility for one hundred and fifty lives constantly on his shoulders. He left the control room without a word.

Couldn't Brown ever be *exactly* on time?

Eight hours on the board, two four hour shifts, and sixteen hours off. In his off-time, he spent an hour and a half eating two meals, three hours exercising, eight hours sleeping, and three and a half hours to

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himself—reading, conversing with the crew, keeping appointments, taking care of miscellaneous affairs. The crew considered him a creature of habit. They said you could set your watch by the time he shaved in the morning. You could.

Linda was sweating hard, glad the match was nearly over. Spinning slowly, she swung at the ball, connected. Rob frantically kicked off in a vain effort to intercept it before the fourth rebound. Had he managed to reach it he would have found Linda in a perfect position to send it back.

It was unfair and she knew it. She had been playing almost every day for three months and Rob was still relatively new to the station, unused to zero-g sports. But she played games, like she did everything else, to the best of her abilities.

Following tradition, Rob floated to mid-court to congratulate her. He did this with a couple of very nontraditional squeezes. She responded with a playful grab, which he managed to avoid, and a shake of her head, which he couldn't.

"Not tonight," she said. "Early duty."

"Lunch tomorrow, then," Rob said, feeling only slightly put down.

They held each other loosely for a moment, drifting slowly, movements causing movements. She almost changed her mind. *Early duty,* she reminded herself with a kick towards the exit.

Tomorrow she would be working with Dr. Turner and he always started early. It was time to administer the post-tour psychological profiles to the members of the crew rotating down on the next shuttle. The examinations were her own design. She was proud of them. Actually, she looked forward to working with Turner. Unlike most of her colleagues in clinical psychology, he actually seemed to care about people.

Outside the women's section they lingered, made plans for the next day, separated.

All Linda wanted was a shower and some sleep. She preferred the one-g showers, never felt clean after the zero-g ones. They were fun once in a while, though, especially with a friend.

She walked quietly past the darkened cubicles. Soft laughter came from behind Maria's curtain, muffled noises of people moving around. That would most likely be Julia, Maria's current lover. There were no secrets on Delta III.

Linda had considered taking a lover when she first came up. There had been lots of offers, both male and female, and she had been tempted. Now she was glad she hadn't given in. It would have complicated matters. Things were good with Rob, had been good since they were kids together in pre-med.

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Rob kept trying to talk her into sharing a cubicle with him. It might be nice, probably would be, but she liked things better the way they were. She occasionally stayed over in Rob's cubicle, but for reasons she didn't quite understand, it was necessary that she keep her own cubicle, her own existence, a little separate for now. Maybe later.

She had stayed on the courts too long. There were three other people in the shower and the water was cold.

The captain's living quarters connected directly with the boardroom so Riggs was there in a matter of seconds after the first alarm. Technically his presence wasn't required, but as a matter of policy he followed everything as closely as possible. Too closely, thought most of the crew. He knew what they thought: *busybody*. He also knew a good commander kept track of everything. He looked over Brown's shoulder.

Malfunction in Life Support Island 2, currently located in bio-sector Baker, 0.5-g level. The mantas. The person who had been using the island inside the manta's enclosure was Marie Rama-Diez, female, age 32, exobiologist. Valve LS12-25/86/7B had stuck in the open position, causing a shunt in the island's airflow system. For the eighteen seconds it took to correct the situation she had been exposed to the manta's atmosphere. She was alive. It didn't look too bad.

The island would be out of commission for quite some time. It would have to be repaired, completely checked out again. So would Maria Rama-Diez.

Even at that she had been lucky. The mantas were basically carbo/oxy creatures and their atmosphere, though caustic, was tolerable in very short doses. Maria had suffered some minor lung damage, injury to her mucous membranes and partial eye involvement. All easily repairable. She would be quarantined for the mandatory twenty days, poked and prodded by assorted doctors, then sent back to work. The situation was under control. Brown had handled it well, as expected.

Riggs stood silently for the remaining fifteen minutes of Brown's shift. He sat in his chair at the precise time, activated it. Rituals were performed, the mantle of immediate responsibility shifted.

Too bad for—what was her name? Julia. Julia Carroll, female, age 36, maintenance tech. Maria's lover. He smiled. Perhaps he did follow things too closely.

Slipping into the rhythm of his shift, Riggs absently tapped the controls to allocate more hot water to the woman's one-g washroom.

Rob turned off his microscope, leaned back and rubbed his eyes. Long day. His back hurt.

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It was frustrating, his work was moving very slowly. He carefully filed away the slides he'd been working on. The creatures were more adaptable than anyone had thought. Somewhere there must be an answer, but so far everything had led up blind alleys. He had gathered some useful information, if nothing startling, to justify the time and expense. Still, something might come of it yet. He adjusted the airflow on one of the aquariums holding his snails.

Rob had infected these particular snails about six weeks ago, so they should be about ready. Wearing gloves and using forceps, he placed a half dozen of them in a small container. Later he would collect the infective larvae as the snails shed them. He swabbed his hands and arms with alcohol and closed up shop for awhile.

He had reached the cafeteria before he realized it was too early to meet Linda. She wouldn't get off for another hour. They were lucky she was getting off at all. In addition to her duties as a psychologist, she had been pressed into service assisting the medical staff. They were shorthanded these days. Linda didn't get much free time.

To kill the hour, Rob decided to walk over and watch the mantas. The 6.6-g would feel restful after a day spent hunched over his microscope.

The female was gravid and about to give birth. There was wide speculation, accompanied by numerous wagers as to the date of delivery. Even the exobiologists had joined the pool and their bets were spread out as far as the rest. Too bad Maria would miss it. After spending so much time with the mantas, it didn't seem right. She had suffered a nervous break-

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down and was back in the hospital sector again. Linda visited her routinely, but as a matter of professional ethics never discussed her with Rob.

The female manta hung by her long talons from the supports, wings spread wide. The male made occasional passes by her, coasting on the breeze generated by several large fans set in the ends of their enclosure. A half dozen people were watching.

Rob sat next to Ed Brown. Unlike Riggs or Gonzales, Brown tended to mix socially with the crew. He and Rob had been in a few fierce poker games together, much to Rob's misfortune.

The female had several small gashes in her belly. The exobiologists said this was normal. The infant manta actually clawed its way out of the mother, using its talons. The male secreted some sort of a fine mist as it flew around the female which accelerated her clotting time so she wouldn't bleed to death. Being used to the strange and complex life cycles of parasites, Rob thought it was ingenious, an alien adaptation. Ed thought it was gross.

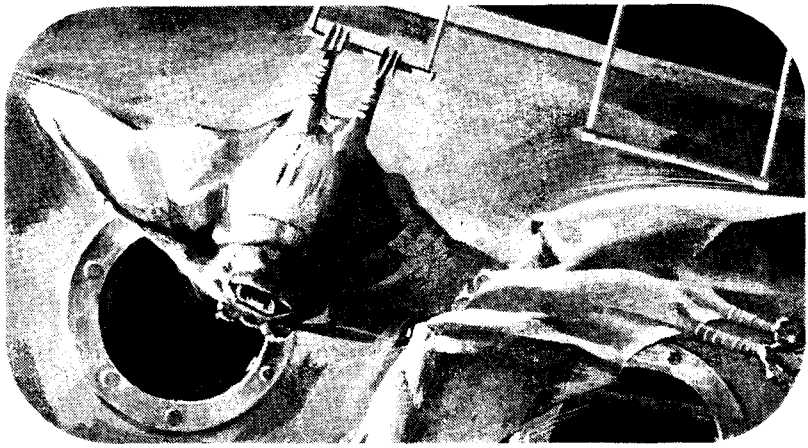
"Look like fish out of water," said Ed.

"Um," said Rob, distracted, his mind trying to piece together their world of wind, their lives.

"Play some cards?" asked Ed. "There's a hot game in the engineering deck."

"I don't know." Something on his mind. Elusive.

"Sam's there." Sam had lots of money and a weakness for drawing to inside straights.



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"Yeah, I guess so," said Rob, standing. "Can't let the rest of those jokers take all his money."

They played cards for two hours. Rob was thirty dollars ahead when he got back to the lab. He couldn't remember where he had left the snails, had to look for them. He had forgotten to meet Linda for dinner, which was okay because Linda had been busy and forgotten too.

Ed was five minutes late relieving Riggs on the board. Riggs was furious, things were getting much too sloppy. He'd have to crack down. There was too much of that around.

By the time Maria died, Riggs was at the end of his rope. Brown had just been hospitalized from nervous exhaustion. The board had been cut back to phase four operation, displaying only the most critical data. Even that was almost too much for two people and he was afraid Gonzales was slipping under the strain.

Maria's death had been a surprise. From a general nervous breakdown she had undergone rapid physical degeneration. Eventually she stopped breathing. That was that. The autopsy hadn't shown much more, nothing you could put your finger on. Whatever it was, it seemed to be spreading.

The early signs were mental rather than physical, resembling senility more than anything else. People forgot things, misremembered events from their past, made mistakes. Eventually physical involvement developed; loss of control of muscle movements, difficulty breathing. Maria's lover, Julia, was the worse case on the station. There were others, however, nearly as bad off. Mostly they were hospital personnel who had

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been in direct contact with either Maria or Julia. It hit the hospital sector hard. Yet other infected individuals had no previous contact with any sick people. It had to have something to do with the mantas, but they couldn't make the connection. In the meantime, Riggs had sealed off the mantas. No one went near them. It didn't make any sense, but they had to have something to do with it.

Due to the shortage of hospital personnel, Riggs had pulled everyone even remotely qualified off their routine jobs in order to take care of the sick, investigate the problem, the disease. There were few fully functional people left in the hospital sector, very few anywhere. The pulse of the station had slowed down, only the most essential work was performed. It was all they could manage. It seemed like everyone was either sick or trying not to get sick, avoiding contact with infected people even though they knew it didn't help. It was hard to tell when a person caught whatever it was. The first sign was usually a mistake. Riggs was waiting for someone to make a big one. It could kill them all.

He had to make a decision soon. Both Gamma IV and Delta II had offered volunteer help. They knew it was a one way trip. Riggs had sealed the station, no one left.

Riggs thought of his wife. It would be night in Los Angeles now, she'd be sleeping. It hadn't been much of a life for her; he was gone most of the time. They'd been married twenty years and space had been his constant mistress. Still, he loved her in a comfortable sort of way. The times they had together were very good.

She didn't know how serious the situation was. There had been other situations, other times. Most of them were over before she even found out about them, abstract events to be shared over a cup of coffee. She lived for his rotations home. He realized there might not be any more.

He flashed Delta II and informed them that he could not justify endangering additional personnel, knowing full well that they would come anyway. He would have to turn them back. It was his command, his decision to make.

Marsha Riggs, age 42, wife, lover. Damn.

So this is what it's like, thought Linda as she walked through the wards, *to grow old, to lose so many things.* She paused at the foot of a bed, picked up the clipboard, read the lab results. The numbers swam before her eyes, ran together. They didn't appear to make any sense. Why had they run a brain scan on this person? What did these results mean? They could be normal for all she knew. She dropped the clipboard. It clanked softly against the bed frame.

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The patient was in serious condition, that much she was sure of. Eyes glazed, he stared dully at her with no sign of comprehension. He breathed with great difficulty, drawing in air with periodic spastic gasps. He had been in the chamber earlier and was scheduled to go back again in an hour. It would help a little.

It all helped a little, nothing helped very much. In any of the other stations this man would be dead by now. The specialized equipment and respirators on Delta III helped a lot, but it wasn't nearly enough. The chamber was the greatest help.

Inside the hyperbaric chamber the atmosphere was pure oxygen, pumped in at extreme pressure. It literally drove oxygen into the patient's bloodstream. Even though it was the largest one in existence, it was way too small. It held ten patients at a time, twenty if they stacked them and even at that they couldn't hope to keep pace. Patients had to be rotated, put on respirators in the interim. Eventually they died. How many so far? Twelve, fifteen, twenty? Linda had lost count. It was only a matter of time.

Time. They all fought it, lived with it, died from it. There was so little time and new cases sprung up every day. No cures, no real handle on the disease. It took so long. Like a slow, methodical killer, it chose its victims, played with them for awhile and killed them. Rob's group was trying to isolate the organism, culture it. They were having some limited success, but Rob was not pleased. Given time they might come up with something. Time was running out for all of them.

She pushed her cart among the beds, reading the medication cards, administering the proper doses. She was accompanied on her rounds today by Per Anson, a first rate mechanic. He knew nothing about medicine. As she read the cards, he looked over her shoulder. He read the labels on the tubes she selected from the cart. He double checked everything. Proper medication, proper dosage. He read them out loud: "Curare, 10cc." His voice echoed against the muted background of gasping patients and the monotonous thump and wheeze of the respirators. Always the sound of rushing air, gurgling through the humidifiers, gently pumped into dying lungs. Always the smell, the feel of death.

He nodded, she administered the meds, they both signed the chart. It was standard procedure these days, constantly guarding against errors, mistakes. Yet so many slipped by. She had made a few herself, none serious. Soon there would be too many mistakes and it would be all over. Better that, perhaps, than to circle Earth just waiting to die.

The patients had been friends, acquaintances. You knew everything in a place this small. Now they were just bodies, numbers on a chart. The faces were familiar, but changed. A filter had slid down behind their eyes,

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taking something very essential away. They were no longer people she had known, they were bodies giving up life day by day.

They finished, stripped and went through the decontamination hallway. It took an hour and Linda felt it was a waste of time. Surely they all had it, whatever it was, to some extent. She and Per sat on benches opposite each other. Suited figures came and went, did things to their bodies. They sat in silence. They were lost in their own thoughts, there was nothing new to say.

She dozed, dreamed of Earth and running free. It was wrong. All the places were wrong, jumbled. She was a child in places she had lived as an adult. Or had she been . . . how old? Something was slipping from her. She stirred, sat up, pressed her back against the cold wall. Her eyes were closed. How old was she when she lived in Greenbelt? She could feel distant vibrations through the wall. Had she *ever* lived in Greenbelt? She couldn't be sure. She thought she had, but there weren't many memories to go with it. She felt half asleep. That was it, she was asleep. No, awake. Half awake. So tired. She looked up, saw Rob. No, not Rob—Per. She tried to stand, slipped, fell on the metal floor. *Rob!* Per jumped away in horror. Suited figures carried her into the ward.

Papers filled his desk, overflowed into loose stacks on the floor. Rob went over his data for the tenth time; slowly methodically. It was too late in the game for a mistake. The flow sheets checked out. It was the first break since they isolated and identified the organism three weeks ago.

The scientific staff was shorthanded, working in unfamiliar territory. Rob was the only one of them with a biochemistry background. He had become the nominal coordinator, checking several times daily with the captain and Ground Control.

They were fighting for their lives, attacking the organism with cross matches, titers and cultures. But things were slipping, it couldn't be helped. Everything had to be triple checked. Jackson, especially, had to be watched closely. Mistakes were creeping into his work with regularity. They couldn't afford to lose his brilliant mind. Without him they would never have been able to isolate the organism. But it was only a matter of time before they lost him too, like the others before him.

The organism was, as they had suspected, from the mantas. The secreted mist from the male manta, to be precise. *Alien.* Anaerobic, gram positive, much like a spore or bacterium. In the female manta it inhibited bleeding, speeded up the clotting process, facilitated birth and the perpetuation of the species. In man, however, the organism faced its own alien environment. It wandered blindly through an infected person's body,

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searching in vain for a suitable combination of biological factors, factors only to be found in a female manta. It eventually encapsulated itself in the human's tissue and began to secrete neurotoxins. The neurotoxins were what caused the major damage. They blocked normal memory and thought pathways. Alternative pathways opened up, creating false memories, hallucinations, senility. Eventually vital functions were impaired, especially respiratory ones, and the patient died. The organism created life in one species, death in another. It was blind, mindless. It was the enemy, it killed. The only approach available was to treat the symptoms, fill the body with oxygen, stall off the inevitable death. Until yesterday, Rob would have sworn the body had no natural defense against the alien invader.

This morning's slides sat by the microscope. Ninety-seven slides to match the ninety-seven deep-agar cultures in the lab. The results were the same as yesterday: ninety-five positive for the presence of the organism and the same two, numbers 42 and 43, negative. The two were cultures from Pope. She had died last week, died like all the others. But something had happened before she died, something significant. She had been producing antibodies against the organism. Not enough to save her, but enough to show there was some sort of defense mechanism at work. At least in some people. Who? And to what degree?

Rob thought he might have a handle on the 'who', though it wasn't much. Cross-checking medical backgrounds between Pope and the other victims in this particular group showed that she was the only female with both an Rh negative factor and a positive Rubella titer. She was also the only one who had produced antibodies. It was circumstantial, tenuous. It was their only break.

Checking medical records, Rob had come up with four other women on the station with similar profiles. Two were already dead. That left Eng, communications officer, and Linda. As things stood, their antibody systems wouldn't even be enough to save themselves, but Rob had a plan. He was sure Ground Control wouldn't like it. Riggs would never permit it and Eng wouldn't go behind the captain's back.

That left Linda.

The board was relatively quiet. Any functions that could be shunted to other stations or Ground Control had long ago been transferred. Even with so much shifted to auto mode, the load was tremendous, too much for one man. Riggs, isolated in the board room, contacted reality only through his dials, his screens.

Isolation. He felt it bitterly. He was doubly isolated from the others; first

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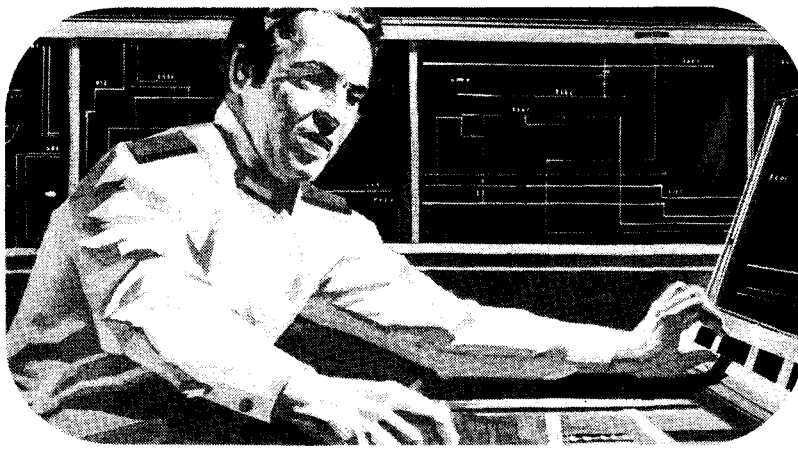
by the isolation of command and secondly by the physical barriers he had erected to keep him functional, an uninfected part of the machine. He had to keep going, it was their only hope. Brown dead, Gonzales down in the wards rambling like a madman, Riggs was the last link to the heartbeat of the station. He waited for his first mistake, the sign that they were all finished. He wondered if he'd already made it and was simply unaware of it.



The others were isolated, too. The whole station formed a series of concentric circles around the most seriously infected. Various degrees of isolation. The sick moved among the sick. Through air locks and decontamination centers they walked among those with a degree of infection that matched their own. It was a one-way trip as they moved slowly toward the center; to the wards, the chamber, death.

The weekly shuttle from Earth was a life-support system for Delta III, bringing equipment, food, supplies; anything they needed except more people. Riggs stubbornly refused additional personnel. He considered everyone on the station, including himself, expendable.

A soft buzzer rang twice. Riggs automatically looked at the clock, 1600 hours. That would be Rob McGregor on his afternoon update. He flipped on the moniter and Rob's upper body filled the screen. Fifteen feet away, yet separated by a sealed bulkhead. Separated by more than that; age, the pressures of a lifetime of command, *responsibility*.

Rob looked haggard, everyone did. Too much tension, too little rest. He supposed he looked much the same. He did.

He nodded at Rob's cathode image.

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"Some progress, Captain," said Rob. "On the negative cultures."

"In what direction?"

"Given time, I believe we can set up a donor-antibody system."

"Time is something they can't ship up to us."

"There might be a way we can get around it, sir. The chamber is the key. Oxygen at high pressure does more than simply support the patient's respiratory system. The organism multiplies slowly and is anaerobic, can't stand much direct exposure to oxygen. It's spread both by bodily contact and through air transmission. In the chamber the organism can't survive outside the body. Avoid direct contact and we'll be able to contain the organism. We could at least hold our own that way."

"The chamber's too small."

Rob took a deep breath. "The whole station could be a chamber."

"No," said Riggs. He thought for a long moment. "Impossible."

"Then seal off a section, move everyone into it. Run it up to seven atmospheres pressure. Pure oxygen. It would work."

Riggs considered the proposal. It was feasible but complicated. The risks were high; explosion, fire. Still, the way they were going, every day was a risk.

"Okay. We'll seal off the wards and the adjacent nursing quarters. Personnel will remove all metal artifacts; rings, watches, metal belt buckles. All electrical connections must be absolutely sparkproof or rendered inoperative. Normal atmosphere will have to be maintained in the rest of the station—I must stay at the board. Lord knows what Ground Control will say. But this is my command, my responsibility."

The additional oxygen required would be no problem. There was enough on board to initiate the procedure and Ground Control would undoubtedly send more, even if they didn't agree with the decision.

"That'll buy us time," said Riggs. "How are you going to use it?"

This was the hard part.

"I'm going to try to cultivate antibodies against the organism. It'll take time, but I think it can be done."

"How? I didn't think you could even culture the organism."

"We can't, not in the quantities we need. I'm proposing an *in vivo* method of producing the antibodies."

"In vivo?"

"If we expose a suitable individual to a high enough level of infection there's a chance we might trigger the body to produce antibodies in sufficient quantities not only to save their own life, but others."

"You want to *infect* people?"

"I believe it's the only way. If we pass a certain level of infection it's

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possible we'll reach a threshold where the body will keep producing antibodies in quantity. Perhaps a sufficient quantity to pull the rest of us through."

"You don't know for sure this will work, do you?"

"The evidence is circumstantial, I admit. The threshold theory is only a hypothesis, but Jackson and I both believe it's the only answer."

"I suppose you've talked this over with the scientists at Ground Control. What's their opinion?"

Rob grimaced. "They're against it, sir. They believe the risk too high for such a low probability of success."

"You don't agree with them?"

"No. *No!* They're playing this thing too conservatively. We're the ones taking the risk. We should be able to decide for ourselves how much of a risk we are willing to take."

"I'm inclined to think they're right in this instance," said Riggs. "You don't seem to have much to go on."

"It's *all* we have to go on."

"There must be other aspects to explore. Besides, if you can't cultivate the organism, how do you propose to collect enough to inoculate these people?"

"Collect them directly from the male manta."

"No. Absolutely not. I've had the mantas sealed, isolated. They're not to be approached for any reason. Damn buzzards, they're the cause of all this, this disruption. No one goes near them. We can't take the chance."

"It may be our only chance."

"That's enough, Rob, Ground Control's against it, I'm against it. It's finished, closed. I've bought you some time. Go use it."

Rob nodded, the screen went blank.

Riggs started on a checklist of things he would have to do in order to seal off part of the station. He buzzed for the chief engineer. He'd have to call Control. So many things. Too many decisions, too little rest. He wondered if he'd made the big mistake yet. The chance of explosion? The mantas? He rubbed his forehead. Too little rest.

Rob decompressed with the crew that was leaving the nursing quarters to pick up the latest shuttle shipment. His presence was not unusual since he often went back and forth to his lab. As soon as the cycle finished, Rob separated from the crew. He headed straight for the mantas, picking up a general issue suit from the lockers.

Three blows with a short piece of pipe removed the seal to the

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entrance chamber. He switched to internal life support, put on the suit's helmet, vented the chamber. When it had filled with the manta's atmosphere and adjusted to the pressure, he opened the far door and stepped inside.

The mantas were excited. The female was squawking, thrashing around on her perch, her swollen belly a mass of deep, raw gashes. Rob could see movement of the baby manta inside. It would be born soon, fully formed, ready to fly, eat, kill.

The male was flying protectively around the female, large talons unsheathed, green eyes rolling wildly. The air was hazy with mist. Life, birth, death.

Rob set his bag down, removed a slender glass tube with a hypodermic needle on the end. He would have to get close enough to the male manta to reach one of the secreting sacs that covered its belly like large warts.

As he approached the mantas, the male attacked. Rob spun out of the way, grabbed one of its legs and twisted the manta to the floor. It flapped awkwardly, beating Rob with its massive wings. Rob juggled the glass tube into position. As he plunged the needle in, the manta jerked, its talons ripping Rob's suit.

Rob gasped, choked on the sudden inrush of caustic fumes. His throat burned, his nose stung. His eyes clouded over with a thin white film. He could feel blood running down the inside of his suit. His only concern was to hold onto the tube and get the hell out of there.

He made his way to the door on his knees, the tube cradled protec-

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tively against his chest. The manta swung into the air, circled, dove at him. It raked Rob's back with its sharp talons. Rob no longer had the strength to resist. The helmet, at least, protected his head. He was giddy, his time-sense blown. It seemed like hours of pain, it was only seconds. The cool air was rushing into the chamber before Rob realized he had reached it safely. While the exchange process was being completed, he removed his useless suit, tore his shirt into strips and tried to stop the worst of the bleeding. He inserted the glass tube into a sterile syringe and headed across the ship towards the wards.

It was a long trip, painful. The empty rooms and corridors amplified every noise he made. He could hear the humming of distant machinery, the constant hiss of air circulating. He felt removed, alone, isolated. His head swam. Weak. Lost a lot of blood. Massive infection, surely a fatal dose.

He floated across the zero-g section, a solitary figure dwarfed by the massive room. A slowly rotating flyspeck.

The rest was uphill. He fought the increasing gravity every foot of the way. By the time he reached the chamber outside the wards he was exhausted.

When the cycle finished he staggered into the nursing quarters. He was ringed by men who warily advanced toward him. Obviously his encounter had been monitered. Riggs had probably been seized by a fit of apoplexy. At what—the danger? Or the breach of his precious regulations?

Everything moved in slow motion for Rob. His blood pounded in his ears. The men moved awkwardly, like puppets on unsure strings. They were afraid to touch him and for good reason, too. Even at seven atmospheres, skin contact was sufficient for infection and he was a walking Typhoid Mary.

He waved the loaded syringe in front of him like a knife. The men parted uncertainly, opening a path towards the wards. He waited for one of them to pull a hero act, but no one moved. They had seen too many friends die too slowly. People were suiting up, shouting conflicting orders at each other.

Linda lay in a bed in the middle of the crowded ward. She tried to move, fought the restraints that bound her arms and legs. Bottles clanked on rods above her bed. Her eyes focused on Rob but there was nothing behind them, no love. Only pain and the single-minded desire to be free from all the things that hurt.

Rob moved her sweat-soaked sheets aside. So thin, pale. Tears came to his eyes. Love, life, death; everything mixed, intermingled.

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Thirty-five cc's, he thought, trying to drive his mind from other things. *Intraperitoneally.* He swabbed an area just below her naval.

He inserted the needle. "Forgive me," he said. Three men in suits were crashing through the ward.

"I love you," he said as he injected the deadly spawn of a windswept world. He had made the decision, taken the chance. It was over now. He had either killed the person he loved or saved her life. He had sealed everyone's fate; they would live or die according to what happened in Linda's body. He would likely never know.

By the time the three men reached him, he had collapsed to the floor.

Hours, days, weeks; they all ran together. Time was a blur of one breath after another. His first disjointed memories were of Linda. Eventually he put the pieces together. Eighteen people survived, one hundred and thirty-two died. His technique had been crude, late, but it had worked.

On Earth it was a different matter. Two shifts had rotated down between the initial exposure and the captain's quarantine. They had scattered to the winds and the winds scattered the disease. There was a lot of work to be done down there and Rob knew that he and Linda would be busy.

In another part of the station Riggs monitered the mantas that had turned 3000 metric tons of precision equipment into an orbiting tin can of death. The small one moved slightly, caught his attention.

Two green eyes—cold, hard—rotated slowly, endlessly searching for a sandy horizon they would never see. ■

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law of the instrument

Once an instrument exists, there is a tendency to use it—regardless of the consequences.

James R. Preston

Jeff Jones

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Later, after the explosion and after she had been kidnapped, Rosy decided that they really were not very professional.

"C," the younger of the two said as she lay on the sidewalk bleeding from the nose and mouth, "if the cheese hadn't legged it when she did I'd be snuff, sure." When they picked her up her head lolled back and banged into the sidewalk painfully and the younger one spoke again. "I'm sorry," he said, and she knew he was not a pro grabber.

That worried her. They said she should not go to the airport alone, it was unheard of, but her roommate had the flu for the third time that semester and there was no one else so she just got on her bicycle and went. Now that it was too late she realized that a large part of her motivation had been the scene it created in the girls' dorm. Out, *alone?* Rosy told them to get back in the Greek play where they belonged.

Down the Seventh Street Bike Road to the Long Beach Bike Road, left to the airbus terminal where she waited in line, nervously fingering the studded knucks her mother had given her when she left for school, until finally she was permitted to collapse the Huffy Multispeed and seal it into the roof pod for the short hop to LAX.

The airbus lifted as the web lowered to seal her into her seat. Rosy relaxed and watched the view from the screen in front of her. Despite the fact that the city she lived in stretched from Crescent City to Tijuana, her segment was still called Long Beach. It looked as if the sea had swept inland, coated everything bright green, and then receded. Every roof, every level space and many walls were covered with lush growth. Corn, beans, peas, carrots, hybokra, the list was literally endless since new hybrids were continually developed. Only the airport was a drab black asphalt spot.

At the Los Angeles terminal she paid a dollar to store the bicycle, stopped outside the Continental section to be photographed, went through the automatic doors and got in line for the rest of the security checks. Before they could begin she turned and ran. Pure fear-power in the form of adrenaline jerked her legs into motion before she knew what she was doing. She didn't know why but she was certain she had to get out of the building, and fast.

The blast caught her just as she cleared the exit.

The knucks! If she could work them free she would have a slim chance of splitting one of her abductors' faces and running for it.

Of course they were no longer in her jumpsuit pocket, and as she was eased into the back of an old groundcar—of all things—Rosy despaired and willed herself to be somewhere else, willed this not to happen.

Nothing changed.

The young one cocked his head to one side, as most phoneplant users do when receiving, and then said,

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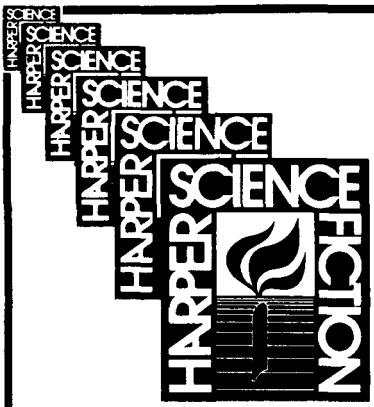

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"First reports coming out now. They caught the guy that set the T-bomb. Natch, he got happy for good before they could question him, but," he paused, whistled, "he had some kind of suit on under his clothes that kept the airport security systems from glimming him. Bomb that went off was one of four that he carried. Must have set it wrong. Stupid bozo." He turned to Rosy. "How's the skullcap?"

She looked up from her prone position on the rear seat and saw a young man, no older than mid-twenties, with dark brown, almost black eyes and sort of blond hair cut shorter than the prevailing fashion. His wristband marked him as a Vocer, but it also held a symbol she could not identify, a tiny circle stamped into the metal. His eyes showed the beginning of laugh lines. Laugh lines. A chance.

"Please let me go," she whispered so the older man in the front seat would not hear. "You know this can't work. It's because of my mother, right?"

"Have they released anything more on the antidetection suit the terrorist was wearing?" asked the older man.

"No, boss, I'll flash it if they do."

"Damn. Six weeks ago that was technically impossible. Six weeks." He lapsed into silence.

"Prob zero on the let-go, coll." He laughed. "Who's your mother?"

"The Net will get you," she was slipping now, fighting a losing battle to remain conscious.

"Scam, coll, we *are* the Net."

Rosy made a last weak effort at bravado even as black spots appeared before her eyes to dance and grow. "Let me guess, you plan on competing with the real grabbers and putting them out of business, on?"

When the pain in her head dragged Rosy back to a facsimile of awareness she found herself lying on a couch in a pleasant cubicle that seemed to be part living room and part office. It held the couch, a desk with built-in com equipment which made it an antique, and no less than four bubbling hydro-eat tanks. She noticed in passing that the tanks were WomboGro Supers, top of the line, and estimated that they represented a year's salary to the average j-coll. Not that grads with jobs were a very large part of the population.

There were three other people in the room. They stood around the antique desk, completely involved in a heated discussion. Two of them were her kidnappers, the young blond one and the older man.

The third was her mother.

"Jake," Rosy's mother was saying, "I don't believe it could be done and even if it could I wouldn't want you to do it. Everyone must serve when called."

"I tell you the Bureau has friends. We can make it look like a computer error. One hundred and one citizens randomed in the Senate election simulation, so one has to be out. You. Matilda, be reasonable. We need you. You can serve the people

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right here. Lord. you know what happened at the airport today, the crazy longjohns that terrorist was wearing. We should have been on top of that, but none of our indicators showed it was coming. That's why we need you." He paused to catch his breath.

"Everyone must serve when called, regardless of age, occupation, or educational background."

"Oh, for—"

"You have Rosy. She can take my place." He started to speak again, but once again she cut him off. "Jake, I'm committed. Tomorrow morning I'll be in Old D.C. to take the Oath and Implants and become part of the Governing Network. Maybe then I can help you with your budget. On?"

He sighed. "I seem to have little to say about it. But there's another thing I don't like. You have to travel too much, be physically present at too many functions. It's dangerous. We'll have a hard time protecting you."

"I'll have my own guards and if it will make you feel any better, which I doubt, you can check them yourself." She walked over to where Rosy lay. "How do you feel, honey?"

"Split, mother, really split. Body on, head really off. I don't scam any of this. I thought I was being grabbed because of you."

"You were, in a sense," the man addressed as Jake said as he joined the two women. "Hello, Rosita. My name is Jake Chen. I was one of the two men who picked you up at the airport."

"You mean one of the men who kidnapped me."

He looked disturbed. "Believe me, it was not our intention to take you by force. We may have saved your life, young lady."

"Sniff it, old man." She heard a muffled laugh from the corner where the Vocer sat. So those lines around his eyes meant something after all. Jake looked as if he might have some kind of attack.

"All right, all right," her mother stepped in. "Jake, why don't you go make everybody some of that wonderful coffee?"

"I don't want any," said Rosy.

"Yes you do, honey. It's real, not syntho. Jake's fat enough to devote a section of his outside garden to growing it."

"A special hybrid designed for our climate," Jake called from the corner of the room where he had pulled a minikitchen out of the wall. "Had to fight off poachers three times last year. My alarm system—"

"Quiet, Jake. Rosy, they really are part of a Net Agency. Have you ever heard of the Bureau of Anticipatory Disaster Statistics?"

"No."

"That's good," said Jake as he placed a tray with three steaming mugs on the table in front of them.

"What about him?" Rosy asked and pointed to the younger man, who was still sitting in the chair next to the desk. He had not spoken since

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she had been awake.

"He doesn't want any," said Jake.

"I didn't hear you offer him any. How come? Because he's a Vocer?"

"Okay, okay." Jake capitulated quickly, and in a few moments a grinning Vocer was seated on the floor across from the others and holding a steaming mug of coffee.

"Now will you let me tell you about the Bureau?" Jake began again, petulantly. "We are a part of the Governing Net with the assigned function of preserving the human race." He said it with such a serious expression that Rosy found it impossible to laugh. "We are mankind's front-line defense against itself."

"What? You a doper?"

"Rosita, have you any idea of the pace at which new technology enters our system? Of how little effort is made to guard against possible misuses? How about the Law of the Instrument? The Law is why we exist. Leaving the math out of it—I don't understand it myself—the Law states that once a thing exists there also exists a tendency to use it, regardless of the consequences."

"So?"

"Look, if you don't have the credits in your account for a bicycle you walk everywhere, right?"

"On."

"Okay. Now somebody gives you an aircar and a bike. You use them *both* even though you only need the bike. Because it is available you use the car."

"Wonderful piece of deduction, Sherlock."

"All right, Lestrade, now apply the same theory to a supernuke. Rosita, the Bureau began as a contingency planning section of the Department of Defense, trying to figure out what the government response to various situations should be. Then we began to predict skyjacker behavior before takeoff. From there it was only a short step to where we are now."

"And where is that?"

"We are no longer on the defensive. The Bureau acts before the fact to prevent the disaster in the first place." Seeing an incredulous look on the face of his listener, Chen hurried on. "Most of it is nothing more than statistical manipulation. Simulation through highly sophisticated number-crunching."

The young man across the table suddenly yawned and grinned at her. "My name's Smith," he said. "Winston Churchill Smith."

"Rosy Dorwarth, but I guess you know that." She turned to Chen. "What does all that have to do with me?"

"Oh, I'm sorry, I assumed you had guessed. We want you to join us. We need you to take your mother's place."

"I'm sorry, Mr. Chen, but I refuse employment. You *kidnapped* me! That's a serious crime, really serious, depriving a citizen of the right to move freely."

"We didn't exactly kidnap you," he began.

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"Can I leave here, right now?"

"Well, no, you see—"

"I can't associate with a group that could engage in that sort of activity, I just couldn't." She paused. "Besides, what about One Job, One Family? Mother's new job as a Senator counts just like any other employment."

"We can obtain an exemption for you. The so-called 'Share The Wealth' Program can be manipulated if need be."

"I don't like that either. You're subverting an attempt to divide the results of productivity in an equitable fashion."

Chen stared at her as if it was hard for him to believe that she wasn't making some kind of joke. Finally he fell back on a ritual that would both soothe him and give him time to think of a way to deal with his problems. "Well, ah, is everyone ready for a second cup? Rosita? Matilda?" Grudgingly, "Winston?"

"Sure," said the youth, "and I'll even do the honors and make it this time. That'll give you three a chance to talk things out." He had collected the cups and carried them to the corner of the room that housed the minikitchen before Chen could think of a reason to refuse his offer. The older man was at a loss for something to say, since the necessity of the existence of the Bureau was so obvious to him it was like trying to explain why you liked breathing. Fortunately Matilda broke the silence.

"Rosy," her mother began, twisting sideways on the couchbed to face her and leaning forward intently, "Jake wants to give this to you in easy stages and normally I would agree with that, but right now I just don't have the time. I have to leave tonight, so here it is. You work for the Bureau from now on. It's the only way I can be sworn in with a clear conscience, and besides that it's an important job."

"No. I won't do it. I said I refused employment and I meant it."

"Honey, you just don't understand. We aren't asking you. We're trying to explain as gently as possible that from this point on you belong to the Bureau whether you like it or not. They *must* have a new Guesser."

"A new what?"

Matilda and Jake exchanged glances. "You don't know?" she said.

Outside the building a heavily-armored produce truck eased through the quiet streets. Surface transport of valuable commodities like carrots and peas was regarded as an unfortunate necessity and what they had now was worse. At least he had a good shotgun, the driver reflected as he cautiously negotiated a corner. The gnarly old man riding in the armored dome behind and above him was reputedly the best in the pool of guards. He was alive and old and that was something.

The hijack was simple and direct. A buried charge lifted the huge truck as if it were made of cardboard and

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dropped it on its side. The old man never had a target for his stun rifle.

According to plan, a group of men ran from their hiding places and shoveled the wreckage away from the rear doors of the truck. The plan, however, did not include Billie Simpson. She was twelve and had never in her short, cruel life tasted the legendary food they began to unload.

Billie-the-Blade ran to tell.

Inside the steel-walled room there was consternation.

"Now, wait a minute, Jake," Matilda was saying, "the ability could be latent. You said yourself that she ran from the airport before the T-bomb popped."

"On one hundred. Saved my meat," said Winston.

While this was going on Rosy was moving, establishing that the coffee pot was empty and the door out of the room was locked. "Say, where are we?" she asked.

"Huh?" Everyone, including her mother, looked surprised that the subject of their discussion should have the temerity to speak.

"Well—not that it matters a great deal at this point—we are in my home," said Jake. "It is just inside what used to be the El Segundo Oil Refinery."

"You live in a refinery?"

"Yes. When oil production switched almost exclusively to Canadian Tar Sands and the crawler refineries this place would have been very expensive to dismantle. SOCAL is big, Rosita, a little under two square miles, so it was converted into office-homes like this one. The steel plates of the tanks provide the best security money can buy, so they sold like hotcakes. Since my unit is on the top floor I also get to use the roof for my garden."

Rosy's puzzled expression still had not changed. "What are hotcakes?"

"Steaks! Swear to snuff, they were taking real meat off that truck. I saw some once when I was a kid so I know what it looks like." Billie had not been this excited since her first fight, over a year ago, when she had wiped up the asphalt with Molly. True, a lucky blow had helped her a lot, a scalp slash that filled Molly's eyes with blood, blinding her just long enough for the final stabbing. But a win was a win and Billie was in.

The leader of the gang sucked his teeth and then nodded to his racers, who faded to pass the word. They would have to move fast, but if they were quick and lucky the hijackers would get the surprise of their lives. Soon the gang would move, heading for the greatest coup of its career. They were armed mostly with clubs, knives, and slingshots, going against stun rifles at least, maybe lasers.

But they numbered over a hundred eager killers. It would be a good fight.

Billie-the-Blade had not been this excited since her first.

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"Jake, we've got a problem outside," said the pretty dark-haired girl who had just entered the room. "Looks like a food riot. A truck carrying some kind of edibles, maybe steaks, was hijacked and now a street gang has attacked the hijackers."

"Another black market shipment bites the dust," mused Jake, "but why tell us? Even for steaks it's too risky to get involved in something like that."

"Security says—wait a minute, here comes something now," she said as she cocked her head to one side for a moment and listened intently. Her eyes widened. "C! The whole neighborhood's joined the fun. Security says they can no longer guarantee the nonviolation of the complex. In fact," she stopped and listened to the voice of her phoneplant again, "they advise all tenants to execute their emergency evacuation plans, preferably by air, avoiding the streets immediately adjacent to SOCAL. That's what they're doing."

"Damn! I told them not to take the low bid for private shooters. Now look what's happened. All right everyone, follow me. Winston, bring the top three of those data discs on my desk." He looked longingly at the coffeemaker and the jar of fresh fine grind but decided they were too bulky to carry.

The younger man moved quickly to scoop up the three plastic cans and then they were running out the door and down a long corridor paneled in the very popular pseudopine, running to the percussion accompaniment of three distant thumping noises.

"T-bombs," said Winston. "Things are getting snuffy real quick."

"You'd like to be up there, wouldn't you?" panted Chen as they turned left once, twice, came to a branching and took the right fork. The paneling abruptly ended. Chen slapped a switch and a dark mouth gaped in the riveted wall. "Emergency slide. Goes down four levels. You first, Winston. Help the others when they land."

He should have said goes down four levels *fast*. Winston vanished, then Rosy's mother, then the girl whose name Rosy had never learned, and then Rosy went into the hole feet first. All at once she was slipping, sliding, moving faster and faster until she was zooming through the utter inside of her eyelids black at some unimaginable speed, with the legs of her jumpsuit whipped up around her thighs and screaming all the way.

She saw a spot of light ahead and before there was time to think about it she was at the end of the slide, floating in the air, and then dumped unceremoniously on the padded floor. She sat for a moment, dazed, before she realized Winston was yelling at her. "Move, move, Jake's right behind you." By reflex she rolled to one side just in time to avoid serving as an additional cushion for the older man's landing.

He picked himself up quickly.

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"Pretty neat gadget, huh? I had it adapted from jetliner escape systems."

Rosy had six units in archaic slang so she was able to follow what he said, but she wasn't about to give him the satisfaction of agreeing that his toy was impressive. "What was that you were saying back there about steel plates and how safe SOCAL is?"

He sighed, "I think we overpaid."

Sometime later they had to stop running so Matilda and Jake could catch their breath. "Jake," said Rosy, "if we're going to an aircar why did we go down four levels?"

"I have something much better than an aircar. I have an untraceable way out that's also safe." He studied three six-digit numbers painted on the wall. "Not much farther now," he announced.

"Good," gasped Matilda.

On this lower level the corridor became cylindrical and began to slope down. They came to a round room lit by a single bulb dangling from a cord. The pipe, for that is what the corridor really was, had such a small diameter that they had to bend almost double to get into the strange room.

"As you might have guessed, for some time we have been traveling through the pipe system of the old refinery. Many miles of pipe were paneled, but since the conversion is far from complete many more miles still bear their original appearance. From now on I must ask you to stay very close to me. I have had an escape route imprinted on my memory." He paused. "Thought I'd never do anything that modern, eh, Winston?"

"On, boss, but I'm real glad you did. I'm not young enough to start to find my way out of here."

Rosy looked at Winston with an expression akin to disgust and muttered something unintelligible.

"I thought you might appreciate it," Chen said dryly. "In that crate you'll find headlamps. Please see that everybody gets one."

Rosy was studying the dozens of openings of all sizes that led away from the room they clustered in. "You mean you've had the whole plan of all these pipes stuffed in your head?" she asked as she accepted a lamp from Winston.

"No, that would have cost quite a bit more and would have served no real purpose. I just know what turns to make to get us out of here, to the north above El Segundo Boulevard, near the home of a friend of mine."

"Hmmm." Rosy put the headlamp on and fastened the chin strap. "Well, next you'll pull out a watch and say you're late. Which rabbit hole do we go down?"

"That large one over there."

"Thanks," she said and hurled herself down another, smaller hole.

For a moment the four remaining just stood and stared as if they expected her to pop back out as suddenly as she had vanished.

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"Well, I'll be snuffed," said Matilda at last in a tone made equally of awe, pain, and envy, "that took nerve."

"Winston, go after her," ordered Chen.

"What are you, fruity? Prob zero, man. You want the cheese, *you* jump down there after her."

"It won't be that bad. You can follow her light if you're quick and you know her abilities will lead her out of the maze of pipes. Besides," and Chen had to force out these words as if he didn't want to say them, "if you don't bring her back you will have failed an assigned task. You have to do it. Most of these pipes connect to the surface at some point. The three of us will be under the old El Segundo Boulevard and at my friend's place in about half an hour. Keep your phoneplant on and we'll try to monitor you."

Now they were all staring at Winston. He groaned and squeezed himself into the pipe.

Ahead of her there was light, behind her dark. Rosy occupied the moving edge, the boundary between the two. Always entering the glow, never arriving. Always hoping, never fulfilled. But she wanted to be in the light so she kept crawling toward it. She never arrived.

Within a few minutes she had regretted her hasty decision but found herself incapable of retracing her first panicky slide, so now all she could do was crawl. The tunnel sloped down and she wished she could find one that did not, but so far she had not encountered any. Now she crawled—thankful that the latest clothing fad in her subcult demanded patches on the knees and elbows of one's jumpsuit—still heading down, looking for up, no luck. Behind her there were noises, but she doubted that anyone would pursue her this far. C! She doubted *she* would have come this far but the pipe was there so she used it.

Once she saw a rat. It was fat and afraid of her light.

Around her pipes hummed and vibrated, colored wires as thick as her leg traced serpentine patterns on the wall. Or was it the floor? Inside the tube they all merged into one. The tiny *E. coli* that was Rosy slipped through the entrails of the living city.

Ahead of here there was light, behind her there was dark. She kept moving into the light.

There was a leak, filling the pipe with water, so she took a side turn and that was how she found the ladder. It was a glorious row of metal rungs set into the side of a vertical tube and it was not until she saw it and the light from the street above that she felt the full impact of her fear, as if until this moment she had held it off by force of will. All at once she was trembling. She gripped the bottom rung of her escape to keep from sinking to her knees.

The riot was really rolling when Rosy emerged from a hole in the

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middle of the street. A little girl stared at her.

"Hi," Rosy said, "say, could you tell me—"

Then she saw the knife in the little girl's hand.

Before she could do anything more than threaten there was a muffled "pop" from behind Rosy and the girl dropped to the pavement clutching her leg.

Winston Churchill Smith stuck his head out of the hole and said anxiously, "You on, coll?"

At that moment the Net Public Safety Unit skimmed over to drop barf gas and screamers into the crowd. Gagging, Rosy and Winston stumbled away from the unbearable sound that drove into their skulls like nails, trying to cover their ears and run and watch for possible attack all at the same time. Smith seemed to know exactly where he was going, nimbly dodging the knots of fighting people as they made their way across the street. In a few moments they were darting into an alley to crouch by the wall and choke. The screamer, an antiriot device designed to puncture the eardrums of anyone in its immediate vicinity, was far enough away to allow almost normal conversation.

"What was that?" she coughed.

"Back there? Food riot. A chance to get something to eat other than vegetables or Net issue synthos. There was meat. Snuff, wish I'd got some. Say, haven't you seen a food riot before?"

She shook her head. "Only on holo."

"C! You colls really are as sheltered as everybody says."

She looked at him defiantly. "Sniff it. I like college, and I still won't go back to your Bureau."

"Yes you will. I'm here to take you back. Rosy, don't you wonder why I followed you into that pipe? When it was about prob zero for coming out alive?"

She shrugged. "Vocers tend to be emotionally tied to their jobs."

"No, it's not like that at all. I'm a two-time loser. One more fall and it's the Mr. Clean reel for me."

She shook her head. "I thought I followed street talk—I've seen all the holos of Subcults I and II—but I don't scam that. What's a 'two-time loser'?"

"Means I've been convicted of two crimes. The Net lets me pay them back by indenturing me to the Bureau for ten years. See?" He held out his arm and she was able to examine closely the new symbol on the bracelet. It was a circle, a circle made of tiny chain links. "As long as I carry out my assignment to the satisfaction of my indenture-holders I don't have to go back. Right now I'm tracking you so it was down-the-hole time."

"Alice to my rabbit."

"What?"

"Never mind, it's not important. What about 'Mr. Clean'?"

"You really don't know? C! That one's easy. Well, if the Net takes me

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back the next thing they do is make me into a good citizen by running the old brain through an erase mode. You come out of it real tame, but a little vague on who you are." He grinned. "So you stay with the Bureau."

"And what will you do if I refuse?"

"Stun you down and call for a skimmer." He looked her in the eye as he said it. She stared back at him.

"I hear recovering from stunshock is very painful."

"On one hundred, coll."

"Then I'll go with you for now. But if you think I'll pass up a chance to get away just because of what the Net will do to you, well, like you said, prob zero. On?"

"Recorded."

But would she really try and escape now that she knew what would happen to Winston? Didn't she owe him something? After all he did save her life—probably—back there in the riot.

The answer was yes, she would run like hell the first chance she got. She knew any concern she felt now over what might happen to Winston was manufactured, artificial, a product of what she thought she ought to feel. It would not even make her hesitate.

As they stood up to leave the alley—the screamers were forcing the crowd in their direction so it was time to move—a small figure lurched around the corner and crumpled to the ground. "Say, look at that, it's the little street kid who tried to rip you," Smith cried. The girl was writhing in agony, twitching silently as she tried to crawl toward them. "C! Wonder how she made it this far with that stunshock pulling her strings?"

In truth the child did resemble a demented puppet as she jerked and flopped in their direction. Rosy found it hard to watch.

All at once the screamer stopped.

"Snuff! They're here already. Quick, help me get her up."

"That little killer? Are you happy or something? What do you want with her?" Rosy was not quite ready to forgive the attempted knifing.

"Zero, cheese, zero. But I can't leave her here for the cops to grab. Now come on, help me."

Running, twisting through alleys in an attempt to move at right angles to the line of the riot, turning corners as fast as she dared and hoping that they wouldn't be around the corner waiting for her, Rosy didn't have time to wonder who the cops were.

They stopped in a boarded-over doorway long enough for Winston to use his phoneplant again. He listened for a moment. "On," he said. "We rat it here for a while unless things get too hot. They're going to try a pickup as soon as air traffic is allowed in here again."

"What are you going to do with her?" Rosy nudged the small, spasm-ridden body with her toe.

"I said we wait here for a while."

"One big, happy family."

"Huh? What does that mean? I

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wish—uh oh, roll it again." He was halfway to the corner before he realized that Rosy was not following. He stopped, still holding the girl, and shouted, "The cops, leg it!"

But Rosy had figured out who the cops probably were and the group of uniformed men that had just entered the alley confirmed her opinion. They wore silver jumpsuits designed to reflect even a laser blast, silver gloves and boots and mirror globes over their heads. By some trick of the boots they all appeared to be the same height—unless they were a matched set, reflected Rosy—except for the slight bobble made when the two in the middle walked across the body of a rioter who had fallen in their path.

"Say, am I ever glad to see you," she said as she stepped out of the doorway and raised her hands.

Faceless behind their gleaming helmets, each one reflecting back a little image of Rosy, they began firing. Fortunately for her the range was a little on the long side for the CO_2 propelled darts so she had a chance to whirl and run after the other two. "I don't understand," she babbled as soon as they were running together, "they just started shooting with no warning, without asking anything, who I was, hands up, none of that, nothing. They just started shooting."

"Come on, we've got to get off the street. Anybody out during a riot is guilty and that includes us." He was forcing open a window leading into an old brick building. All at once it gave. He hoisted the girl through and turned to Rosy. "Through the window, cheese. Now."

He's mad, she thought, because he nearly lost me back there and blew the whole thing. Well, well. She grinned at him and went through the window.

The corner of the warehouse they dropped into was somebody's home. A young woman with a big knife faced them, flanked by three small children who looked meaner than their mother. Father was out getting a steak, no doubt.

"Passing through," said Winston, "no sanctuary needed."

Mommy pointed with the knife. Rosy made a mental note to obtain some kind of sticker as soon as possible since it seemed like everybody else had one.

Winston picked up the girl and they began to walk rapidly in the direction indicated. That warehouse connected to another, and another. In each of the three most of the available floor space had been taken over for living quarters. Buildings old enough to have windows could not be made safe enough for the storage of goods, but they were fine for people.

By the time he thought it was safe to try the street again the girl, now tagged as Billie from a tattoo on her arm, was feverish and bathed in sweat. The twitchings had become much less violent and she moaned constantly. Winston put her down

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and ripped open the ragged leg of her jumpsuit. The calf where the stun-dart hit showed a long purple bruise with ugly red streaks climbing toward her knee. He closed his eyes for a moment. "Allergic reaction," he said grimly.

"What does that mean?"

"It means the kid's snuffed unless we can get her to some kind of med really fast. Too fast."

"She'll die? But I thought the stuff on the darts was harmless. I thought that was why they used it."

"On. And you thought the Public Safety boys wouldn't shoot before they found out what they were shooting at, didn't you? To almost everybody the stun poison is harmless, but this kid's one in a hundred. And I shot her." He stared at the small form lying on the sidewalk. "I want you to start walking. Don't look back. I'll catch up with you. Don't even think about running. Down here they'll kill you for your clothes."

He moved his shoulder in an odd manner and something shiny slid into his hand.

Yes, she really would have to get a knife. Everybody had one.

"What are you going to do?" Then, as she realized, louder, "What are you going to do?"

"Listen, you stupid coll, this girl is going to die a real mean death. We can't get her help so I'm going to do the only thing I can for her. It's my responsibility."

"Are you fruity or something? Public Safety is just a few blocks away and they all carry medkits. I know they do because I saw a holo in a pop culture class. I'll go get help and—"

"You still don't get it, do you? Look at her wrist. No bracelet, coll, none-o. The kid's unregistered, so to them she doesn't exist."

"They'd let her die? Here in the street like some kind of animal?"

"Well, if they were kind they'd make her happy for good, like I'm going to, but they probably aren't kind. Now take that walk, Rosy, because the next reel isn't the cartoon." He rolled the child's head to one side, exposing the carotid, gently, ever so gently.

"Wait," Rosy screamed, "across the street, second floor room, the guy's a paramed."

"In this neighborhood? How do you know?" All at once he understood. "C!" he gasped, "you really can do things like that!"

Albert H. Jasper, twenty-five years old and just out of med school (channel 98 four hours a day for three years, followed by one year of study at a school of your choice) with his Guild license newly framed and hung, sincerely wished they had picked someone else. Mellia, fiery and dark, was about to give him his graduation present, and he'd been trying to make her for a long time.

"Emergency!" Winston hollered. Jasper cracked the door. "This girl got hit by a stun-dart. Now she's

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showing allergic reaction. We need help quick."

Jasper opened the door (which showed just how green he was) before he saw Billie's wrist. "Unregistered. She's unregistered. I can't treat her. I'd lose my license. The Guild says that—"

Winston leveled the gun at his face. "I don't have time to count or any of that snuff. Either you start treating her right now or you lose an eye. And then I find your kit and treat her myself."

Jasper got to work.

All at once a female figure appeared in the doorway to the other room and pointed a gun at Winston. Rosy's first thought was two rooms, how does a paramed rate two rooms? And then she saw the stupid, surprised look on Winston's face and saw that he was turning too slowly, didn't even have his gun out, and then she started to move.

The dart struck her in the chest, blossoming through the jumpsuit like some tiny, malignant flower. Rosy's last thought as she crumpled to the floor was about allergic reaction. She hoped she didn't have it.

"Damn fool thing to do," Jake was saying as she came to. Lately she always seemed to find herself regaining consciousness in strange places. It was getting to be a habit. This one seemed to be a standard living room/bedroom combo, with much of the floor space given over to the usual bubbling hydroponic tanks. In addition to the tomato crop, this minifarmer also raised catfish. Several of them stared at her through the clear walls of their tank. It was somewhat disconcerting.

"Bang on, boss. Next time I'll let her die." Winston sounded mad.

"And just what do you think she's going to do now? You stupid, irrational—"

Winston walked away from his superior. He came over to where Rosy lay and said, "Hey, kid, how do you feel? That was some flying squirrel leap."

"Yes," Jake chimed in. "Winston informs me that you did a very heroic and, I might add, a very foolish thing. At any rate, we are all grateful that you came out unscathed."

"Pain on?" asked Winston Churchill Smith.

"Is it ever! More than anything I can remember. What happened after I got stung?"

He grinned, "Don't say 'stung', only holo characters call it that. Say 'tagged out'."

She stuck out her tongue.

"Well," he continued, "not much happened. I shot the med's woman, he saw the error of his ways and started to help us for real. Then some friends of Jake's came and picked us up, we brought you back here and pumped you full of antispasm drugs and one that should stop the pain in a minute. And that's it except that now Jake says it was all for nothing. He says we can't help Billie."

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"Why the snuff not? He can't dictate our behavior. Tell him to get happy."

"And just how," the older man sighed, "do you propose to help her?"

"Huh?"

"This little killer you picked up is unregistered. Legally she has no existence. She does not qualify for Medaid, a job, or even food coupons. My garden was not damaged in the riot, but even so it will not support another person. Good Lord, whoever she lives with will have that much less water because she will not be figured into the meter setting. And you can't admit harboring an unregistered. The 'It's Our Earth' boys will be on you in no time."

"Oh, and if we tried to help her you might have to give up your precious coffee and, and—"

"Easy, Rosy, easy," Winston said. "Look, Jake, you're right, of course. I forgot the kid was illegal. But, listen, the Bureau's got friends. Use them. You can help us if you will."

"What, for that, that creature you found in the gutter? Do you know what she is? The kinds of things she's done? Good Lord, the only fact we have about her is that she tried to kill Rosita, the Bureau's most important asset."

"You're right, I am your most important asset. I know what a guesser does now. Your simulations can't do it all. You need people like me, people who, uh, know where to look for things. And if you won't help us then I won't help you!"

"No, Rosy, no good. They can make you. Snuff, they can make me make you." Winston broke in. "Jake, all of what you said about Billie is true. I know what she's like. I used to be like her. What I'm asking is for you to back us on this even when you don't approve. C'mon, help *us*, me and Rosy. You know it's ten to one in favor of the kid running back to that gang again, first chance she gets. Just figure a way so she can stay if we can make her want to."

The older man walked over and fiddled with the coffeemaking equipment for a while. It crossed Rosy's mind that he must have gone back to SOCAL to retrieve it.

"Well, she'll have to bathe regularly," he said at last. He hesitated, then went on. "A lawyer I knew once did a search on the subject of giving an illegal person legal status. Now, I don't think you'll like this—"

"We'll do it, whatever it is," said Winston.

"It's an old statute. Very out of date but still on the books. I doubt that it's ever been applied in circumstances like these, but it exists so we'll use it. In my friend's opinion it does provide for post-conception registration. It just might get your little ratpack friend a bracelet." He paused.

"You two could adopt her."

One big, happy family.

Somebody's always using a wrench as a bludgeon. It's the Law of the Instrument. ■

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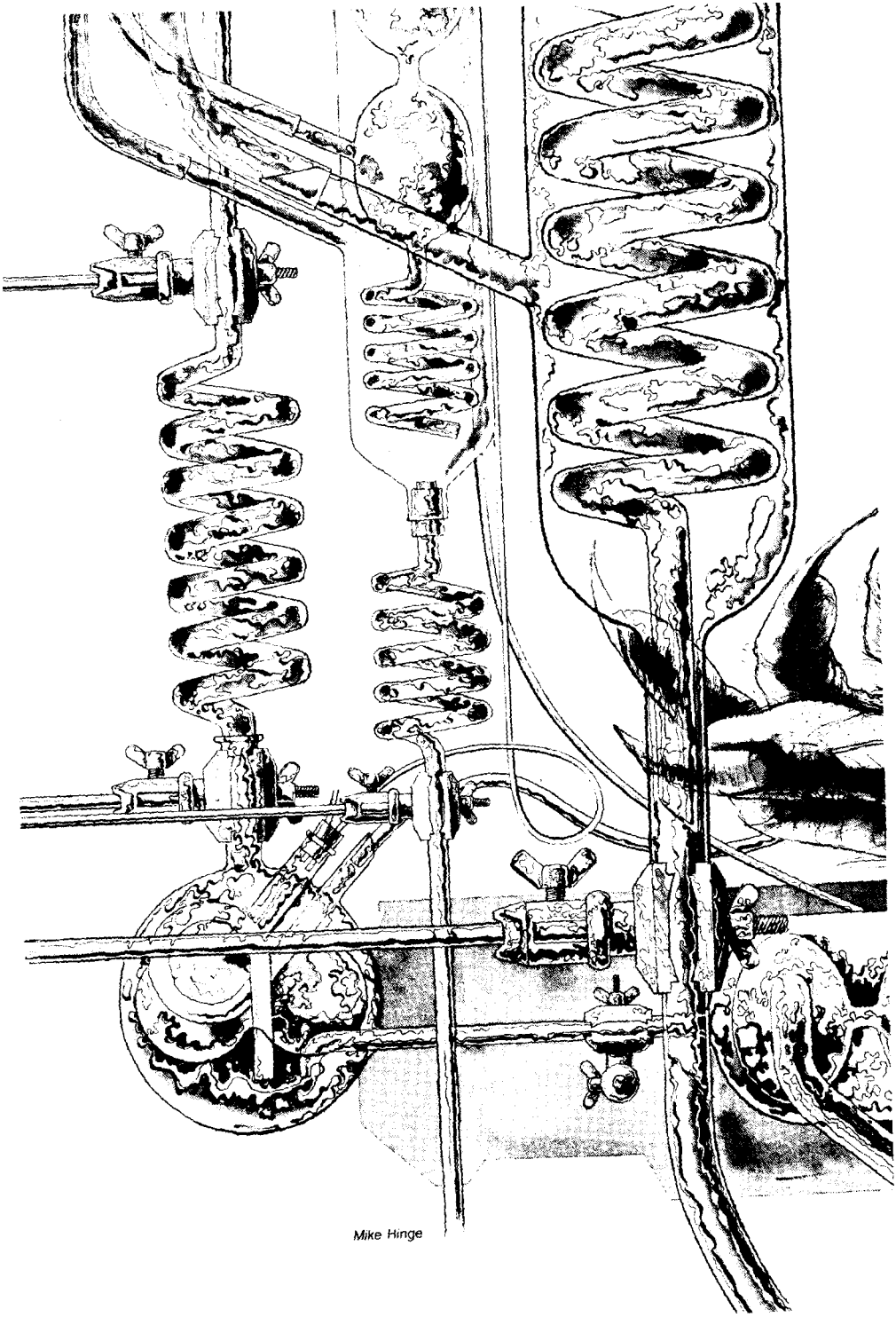

Mike Hinge

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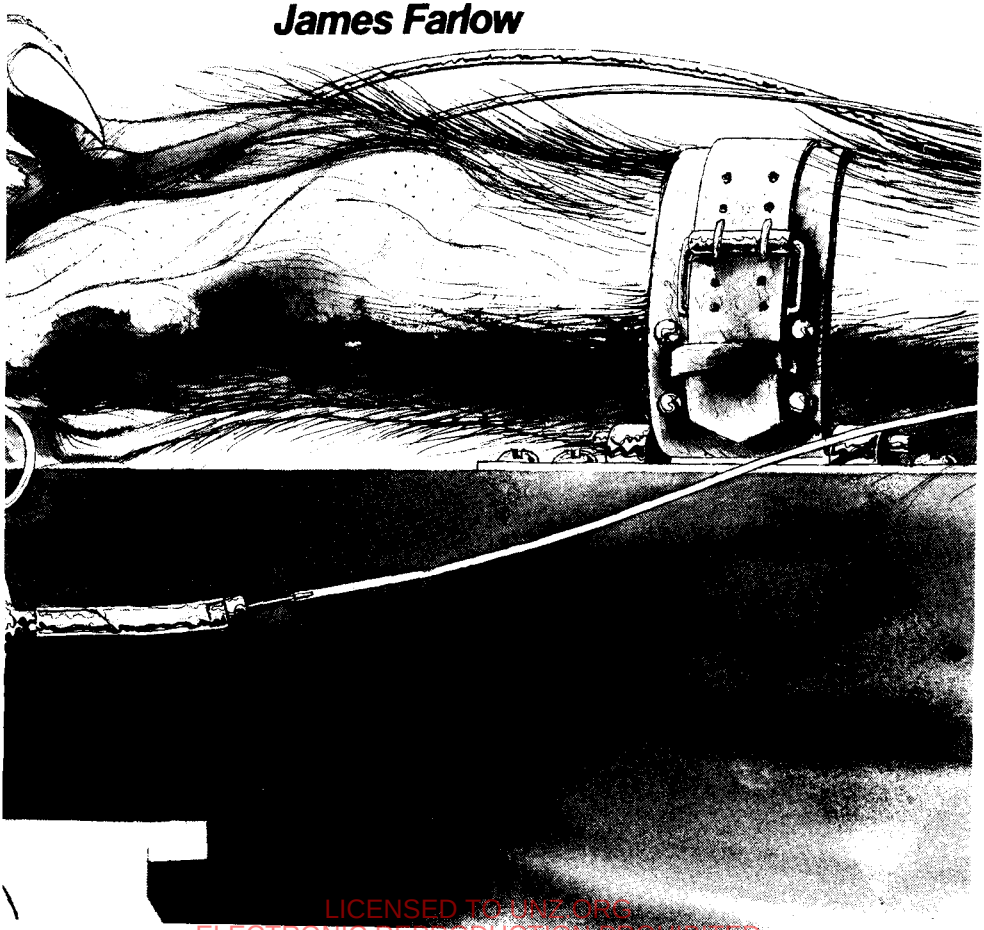
the demythologized lycanthrope

Cancer research is hindered by the lack of a suitable experimental animal.

James Farlow



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A quarter-moon had risen from the sea as I turned my car off the hill road onto a little drive leading into a wooded peninsula. Mixed hardwoods and conifers flanked the driveway, and in the moonlight they were washed in a rather ghostly white—very pretty, I thought. I passed through an open gate, and a mile or so later the drive ended in a small parking lot. Beyond was a complex of single-story buildings—the Northeastern Marine Biological Laboratory.

I was surprised by the large number of cars in the lot and the many lighted windows in the buildings. There seemed to be a lot of activity for so late an hour. However, that explained Dan's request that I meet him there, rather than at his home.

Dr. Daniel Mackerman is an environmental physiologist known for his work on the physiology of human comfort—that is, the combinations of natural or artificial temperature, thermal radiation, humidity, and air movement that are most conducive to various human activities. I'd heard that he was trying to determine the optimal microclimate for long-term underwater colonies along the lines of the Tektite project.

Consequently I'd been rather surprised to receive a letter saying that he'd begun work on a new project that would be of great professional interest to me. He asked me to drop by the lab after I'd finished a guest lecture on my own research—somewhat esoteric studies of growth/differentiation in some equally exotic Asian rodents—at a local university.

Well, we'd been roommates for a couple years in graduate school, so I'd planned to look him up anyway. I was a little miffed that he hadn't come to my talk, but he claimed in his letter that tonight would be especially busy as far as work was concerned. Then why not have me come tomorrow, I wondered as I left my car and walked toward the buildings.

After a few yards the peninsula abruptly narrowed, and I found myself facing a six-foot-high chain mesh fence. This surrounded an elliptical concrete pool that stretched the couple hundred feet from one side of the peninsula to the other. I guessed that the artificial pond had been deliberately built here to facilitate cleaning and (at least during the summer) free circulation with the ocean. A wood bridge arched across the twenty feet of pool width to the sidewalk on the other side. From a telephone pole near the first laboratory building a powerful light was trained on the bridge and the pool, and as I opened the fence gate and stepped onto the bridge I could see why.

Five or six black shapes, the largest maybe ten feet long, glided back and forth through the water beneath me, and I remembered reading that a staff ichthyologist had managed to stock and maintain a

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small colony of bull sharks. He was interested in agonistic behavior in the fishes, but had sold the project to the Office of Naval Research by doing parallel experiments on shark attractants and repellents. The chain fence was obviously intended to preclude unplanned deviations from the normal feeding schedule.

I was met at the first lab building by a young fellow named Terry Rosen who said that he was one of Dan's technicians. Dan's office was in the next building, and as Terry escorted me there he explained that nearly all of the lab's nocturnal activity was connected in one way or another with Dan's new project.

As we entered the hall of the second building Dan charged from his door and stalked away from us, intent on a computer printout. Suddenly he realized that he wasn't alone and spun around in his tracks. "Bill!" he exclaimed, and turned back to meet us. "Great to see you! How'd the seminar go?"

"Not bad," I replied as I shook his hand. "Just the usual grad students trying to score debate points. How's the family?"

"Just fine—you'll see them when we go home. Naturally you'll stay with us a couple days."

I started to say that I had to get back to my job at the west coast university where I teach, but he dismissed that with a wave of his hand. "We can talk about it later," he said. "As it is, you're just in time for what I wanted you to see, but we'd better hustle." He grabbed my coat and tossed it at a chair in his office before hurrying me down the hall.

Dan steered me into a large room on the left. Two young women and a much older man were hunched over chart recorders, oscilloscopes, and several other elaborate instruments I didn't recognize. It looked more like a hospital's emergency ward than anything else, and I was about to ask Dan what it was all for when he called my attention to a large window I hadn't noticed as we were coming in.

Through the window, which Dan said was one-way glass, I saw a young man lying on a surgical table. He was fairly tall, blond, clean-shaven, and was wearing a surgical gown. He was asleep; something was being given him intravenously. What really surprised me, though, was that he was strapped down—arms, legs, torso, and neck—with thick leather bands.

A door opened behind the table and a male nurse entered the cubicle. He quickly attached an EKG terminal to the man's chest and fitted a transparent gas-masklike affair to his head. Dan glanced at a wall clock and picked up a microphone. "Five minutes, John," he said and the nurse nodded. He fiddled around with a few more leads and started to leave when something caught his attention.

"Hey, Dan, the chest strap screw has come loose and fallen out, and I

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can't find it," came from a wall speaker near me.

"Oh, great!" muttered Dan and grabbed the microphone. "John, there isn't time to fool with it now. Take a look at it after this run, will you? He's pretty heavily sedated this time, so it doesn't really matter."

Dan turned to me and said, "Things are going to get pretty hectic here in a couple minutes, so I'm going to have to ask you to sit quietly and observe without asking any questions. I'll explain everything later, okay?"

I nodded and sat down where he had indicated.

Dan looked at one of the girls. "How's the heart rate, Sheilah?"

"Still normal," she replied. "Hold it, it's starting to pick up now."

"Oxygen consumption starting to rise, Dan," said the other girl.

"Right. Deep-body temperature?"

"Climbing a bit, but not too rapidly yet," said the older man. "We've still got a couple minutes before it really takes off."

"Okay, sounds good. Just make sure everything keeps recording; it should be a routine run. Here we go," said Dan.

It started slowly. Initially I had trouble convincing myself that anything unusual was happening, but once the rate of change accelerated there was no use denying what I was seeing. The man's body was changing its shape. His height visibly decreased, his chest and limbs became much thicker; his surface musculature seemed to have better tone. The man's body was actually altering itself from a large but unimpressive build to a small, but spectacular form. I had the impression that his strength was probably greater now, in spite of his smaller size.

"Everything still okay?" Dan asked, and received a series of affirmative answers.

The man's body was now undergoing further changes. His fingers and toes became massive, and grew impressive talons, those on the hands larger than those on the feet. The man's pale skin darkened and hair appeared and thickened to a continuous gray covering of fur. Although most of his face was covered by the mask, I could see that it was now similarly fur-covered. His blond hair grew longer, turned gray at the roots and finally formed a rather luxuriant whitish-gray mane around his head. The shape of his face altered, the jaws became longer and the nose formed a rhinarium. The man's ears, visible through his mane, grew long and pointed.

The entire change lasted no more than fifteen or twenty minutes, but it left me rather badly shaken. I looked at my hands; they were trembling far beyond what my three cups of coffee at supper would have warranted.

"Well, he's stabilized," Dan announced. He turned to me with a grin. "Hey, Bill—what do you think of my werewolf?"

Without waiting for an answer, he gave a few instructions to his techni-

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cians before coming over to where I was still sitting. "We can relax now. He'll remain as he is for several hours, so why don't we go to my office and I'll give you the lowdown on him." I grunted weakly and had trouble getting to my feet.

Surprised, Dan said, "I didn't think it'd have this much effect on you, or I'd have given you some warning. Though I'll admit I was pretty shook up the first few times I saw it. Come on, I'll get you some coffee when we get to my office."

With my nerves as rattled as they were, coffee was the last thing I needed, but I was still too shocked to protest. As we were leaving the room Dan turned and asked, "Anybody feed the dogs tonight?"

"Terry said he did," answered one of the girls.

"The former director of the lab was crazy about security during the student riot days," Dan told me as we walked to his office. "What we have worth bothering . . . I never really understood. But there's a high fence around the complex grounds, even on the ocean side, although with the trees you can't see it from the drive. The main gate's always left open these days. We used to release four German shepherds after hours, but now we keep them in the kennel as communal pets. I have a couple rifles locked up in my office, and sometimes on fall weekends I take one of the dogs up into the mountains for a little hunting."

By now we were in his office and I took the coffee, which was very bad, as coffee in such places always is. Dan pushed a pile of journals and unanswered correspondence to one side of his cluttered desk and placed a television console on the desk.

"I want to show you a videotape of the transition that we made when the patient first arrived. We had him heavily doped tonight; you'll see why after you've viewed the tape."

The tape began with the changes I'd already observed, but this time the young man was neither strapped down nor sedated. During the metamorphosis he moaned and thrashed about, and when the change was complete he exploded from the bed and glanced warily about. Then he stalked around the cubicle in a half-crouch, the clawed fingers of his hand flexed. His gait was extremely fluid; I had a mental image of a huge, bipedal cat.

Suddenly he jerked his head toward the camera (which had been mounted just above the observation window), uttered a high-pitched, cougarlike scream, and leaped at the window. I could clearly see his elongated, lupine muzzle; his canine teeth had become long fangs and his molars, so help me, had changed into carnassiallike shearing structures. Repeatedly he lashed at the glass, his claws clattering against it and sliding ineffectually away.

"He's attacking his reflection," Dan noted. "But he's clever, far brighter than any wild carnivore would be under similar circum-

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stances. See, he's already figured out that the enemy is only his reflection. He's retained a good deal of his human intelligence.

"There—he's trying to open the door that leads into his room. We were pretty darn scared that he would do it, too! But his hands, although beautifully shaped for killing prey, have lost their precision grip, and he can't turn the doorknob."

The creature suddenly roared, a deep, full-throated cry that made the console's audio system resonate, and threw himself against the door several times. Failing to force it open, he ran across the room, searching with increasing frenzy for an exit. He gave a new scream, a high-pitched ululation, and abruptly collapsed to the floor and lay motionless. Dan switched the tape off.

"We nearly lost him there," he said soberly. "We thought he had just passed out due to overexertion and would wake up shortly. Nobody was very eager to go in there and look him over. It turned out to be more serious than that, as I'll explain in a minute."

Dan reached behind his desk and pulled a loose-leaf notebook from a shelf. "Here are some data we took on him during later transitions. By the way, we kept him either sedated or securely tied down in these later runs. I didn't want him battering himself to death trying to escape.

"Here, look at these graphs. At the moment the change begins there's a rapid increase in oxygen consumption and heart rate. Soon after begins an explosive rise in deep-body temperature, and he starts to sweat and hyperventilate in an attempt to dissipate heat and keep his temperature down. I don't see how he avoids alkalosis. Here's a photograph of him during this stage. See how flushed his skin is? That excess heat is really bothering him.

"However, his thermoregulatory responses are inadequate, and his heart and metabolic rates and body temperature continue to rise until the critical point where he has completed the change to the bestial form. Now all three parameters begin a gradual decrease, but they equilibrate at levels above the normal nonbestial condition. Basal metabolic rate, for example, is about 25% above the normal level.

"Metabolic scope is even more impressive, the increase over normal values being even greater than that of BMR. The precise increase is difficult to measure because we determine it while he's struggling against the restraining straps in response to mild electrical shock. We could get more accurate values if we could get him to run on a treadmill, but if we tried that he'd probably tear the apparatus and a few technicians apart in the process. The important thing is that he can experience high levels of activity for long periods of time without any significant lactic acid buildup."

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"Which would make him a tough customer to tangle with," I said. "Not only is he stronger than most normal people, his endurance is also much greater."

"Exactly," said Dan. "Just what you'd expect in a carnivore that has to run down and kill large prey animals.

"He has an incredible appetite. He's no longer overheating, but his cells are still grinding away at an unusually rapid rate. *In vitro* tissue cultures show this very nicely. In fact, his problem now is *conserving* body heat. That's why he has the fur. Without it, he'd be losing heat at a rate that'd be impossible to balance by background thermal flux and food intake. As it is, he reminds me of a great big shrew.

"That's why he collapsed that first time. He nearly died of starvation before I guessed what had happened to him. In later runs we either fed him intravenously or provided him with a lot of raw meat. He really gorges himself in the latter case."

"How does he revert to his normal condition?" I asked.

"In brief, it's a reversal of his change to bestial form, although physiologically it isn't quite as demanding," Dan replied. "The body fur is gradually shed over a period of a couple hours. At the same time his body increases in mass and reverts to its normal form. A good bit of his bestial food intake serves as fuel for this growth. I should also say that his appetite picks up a couple days before the change to bestial form occurs. A lot of energy is needed whichever direction the change is going."

Dan put the notebook back on the shelf. "It's interesting how many of the old legends about lycanthropy turn out to have a factual basis," he said. "For example, this stuff about the transformation occurring when the Moon is full. We've found that the change is based on an endogenous cycle that is about a month long. The full moon entrains it, and if the lycanthrope is prevented from seeing the phases of the Moon his cycle tends to drift, even though its length remains the same. The change occurred tonight even though there's only a quarter-moon."

I was impressed. "Who is this guy, anyway?"

"His name's Victor Tormany, and he's the son of an Eastern European friend of mine—a rich old count, no less," said Dan. "According to the father, Rudolf, lycanthropy has appeared every few generations in the family for hundreds of years—I've got a geneticist trying to figure out how the condition is transmitted by studying genealogical records of the family; it's probably a recessive trait.

"The condition showed up in Victor a few months ago and scared the Tormanys witless. Rudi hoped that American medical technology had advanced to the point where treatment of the malady was possible. He's a proud man, though;

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didn't want to take Victor to a big hospital where there'd be a lot of publicity. So he asked me to help.

"After seeing the transformation myself I became an instant believer in lycanthropy, but didn't feel I had the background to handle such a case. After much pleading, though, Rudi persuaded me to attempt to diagnose and cure Victor's condition. Since then, Rudi has bankrolled my efforts to quietly assemble a team of experts in a variety of the biomedical sciences here at the Marine Lab. We've made some progress, but a cure is still a long way off.

"That's why I wanted you to see the transformation tonight. I'd like for you to join our team."

"Me?" I exclaimed. "How would I fit into your research program?"

"It's your expertise in mammalian growth and morphogenesis that we need," Dan said. "Victor's various cell types must be multiplying and differentiating extremely during the metamorphosis. What starts them going, and how do they know when to quit?"

Then it hit me. "You know what this sounds like, Dan? Oncogenesis! The various kinds of cancer show just such a rapid cell proliferation, although the time scale is longer and there isn't much differentiation!"

Dan grinned. "I'm way ahead of you," he said. "I think lycanthropy may well be similar enough to cancer to make it a useful model, and with its short time scale it'd be far easier to study. Rudi's money has been helpful, but we need a lot more to really investigate the connection. Can you picture what'll happen when we present our preliminary data to NIH and NSF and submit grant proposals for expanded studies? Rudi's given me permission to do so. Man, they'll be begging us to take their money!"

And so we sat, pleasant fancies of fat research grants and (who knows?) Nobel Prizes dancing in our heads.

It was at that moment that some little old lady decided to set her thermostat above 68°, or something equally ridiculous, for the lights suddenly went off all over the Marine Lab and (as we later learned) a good bit of the rest of the area as well.

"And for service like this they want a rate increase," came a mutter from Dan's chair.

"How soon does your emergency backup system switch on?" I asked him.

"What do you mean?" he replied.

I groaned. It turned out that, being a marine research facility, the only such setup the lab had ever needed in the past was something to keep experiments running and to prevent the thawing of frozen specimens. It hadn't occurred to Dan that something more elaborate was required if he planned to run a werewolf hospital. Furthermore, those members of his research team who had worked in major hospitals assumed that Dan had set up such a system without

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ever thinking to ask him if he had. Of such things is destiny made. But our problems were only beginning.

It seems that one of the technicians in the observation room had noticed about two minutes earlier that one of the electrical leads had worked loose from the werewolf's left arm, giving rather funny looking data on the recorders. She called this to John's attention, and he entered the cubicle to correct the situation. Then the lights went out.

In the observation room a litany of swearing was sung, and in the cubicle John groped for the door, planning to find a flashlight and return to fix the connection. Instead he tripped over some of the wires of the setup, and his one hundred eighty-five pounds pulled everything onto the floor, including the sedation and intravenous feeding systems. On the way down John hit his head on the side of the operating table. He landed on the floor writhing in pain, and rolled into a little ball beneath the table before he blacked out. This was to save his life.

By now everyone in the complex was looking for flashlights, candles—anything—Dan and myself included. The best we could come up with was a Japanese-made keychain with a small penlight attached. Just the thing for nocturnal bouts with locked cars, but a bit dainty under the present circumstances.

"I want to take a look at Victor," said Dan. "He should be okay; his nutrient jars won't need changing for some time. But I'll feel better after I've checked. Want to come?"

I did, and we gamely tried to pick our way around carts loaded with preserved specimens or chemicals. The tiny flashlight was some help, but not much. We finally reached the entrance to the passageway leading to the lycanthrope's cubicle, and Dan shined the light toward the far door.

"What idiot left that door open?" he asked. "That's really sloppy. Somebody's going to be in trouble."

A tearing sound came from the little room, followed by a guttural growl that sounded almost like a chuckle. For a moment neither of us could move; I could almost feel the nerve oozing from my body, and

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something with very cold fingers was poking around inside me. Dan recovered first and made a mad dash for the cubicle's door; his action broke the spell and made it possible for me to move again and I followed.

Had John passed out in the open, the werewolf might have stopped to kill and eat him, but as it was the lycanthrope didn't see him lying beneath the table. What he did see was the door open, but closing rapidly.

Dan had slammed the door shut and started to throw the bolts when the werewolf crashed into it from the other side. The door flew open and Dan was sent sprawling backwards, barreling into me as I came up from behind. We fell into a heap and I watched the flashlight slide along the floor to the far end of the hall, where it went into a little spin before winking out.

Something sharp jabbed into my shoulder and lifted me off the floor. I screamed and kicked out as hard as I could in several directions, finally connecting with a furred body. A doglike yelp came in response and I was dropped.

Several seconds passed as I lay where I had fallen, expecting to hear St. Peter's voice at any second. Then the lights came back on, and, encouraged to find us alone and alive after all, I was able to whisper, "Dan, are you all right?" He moaned an affirmative, and we helped each other stand up.

A human scream came from the main hallway, followed by shouts and a clatter of equipment crashing about. Dan staggered toward the corridor, and this time I was right behind him. We turned into the hallway and saw the werewolf stalking toward a girl who had been backed into a corner and was sobbing for help. Nearly everyone else was standing in wide-eyed silence; the older man I'd seen earlier lay in a heap near the lycanthrope, his breathing shallow and his face very white. The werewolf was moving somewhat uncertainly, his eyes squinting as though the light hurt them.

Suddenly a big, heavily built technician jumped toward the monster, almost pulling him off his feet; Victor tottered unsteadily for a few steps but then reached behind his back and grabbed his attacker with his right hand. Although the man must have outweighed the werewolf by at least fifty pounds, with the one arm Victor lifted him above his head and hurled him easily down the corridor.

By now a number of people were moving cautiously toward the girl, but the werewolf roared and lunged toward the group; they broke and ran toward the end of the hall. Victor loped after them, but Sheilah, who was one of their number, abruptly stopped and grabbed a gallon jar from a cart. This was filled with fishes preserved in 70% alcohol. Sheilah whipped off the lid, and as the werewolf leaped toward her

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threw its contents into his face. The monster howled and dug his fists into his eyes, and careened head-down away from her. The rest of the group parted to make way for him as he passed, nobody trying to stop him. Coming to the building's main door, Victor groped about its surface before barking with frustration and pounding at the door with both fists. The flimsy wood cracked lengthwise. The lycanthrope threw his weight against it and it gave in a shower of splinters. The werewolf stumbled off into the darkness.

Beside me Dan sighed deeply and slid slowly to a sitting position on the floor. "Anybody hurt? Mac?" he said in a tired voice.

Terry Rosen was looking at the old man on the floor. "Dan, he's in pretty bad shape. I think he may have had a stroke."

"All right, the power's back: call an ambulance and get a doctor up here. You'd better call the cops, too. We're going to need help handling Victor until he reverts."

"How long till then?" I asked.

"Five or six hours. How's Stan?"

The big guy who'd jumped the lycanthrope grinned weakly. "I think my shoulder's dislocated, but it's not too bad if I don't move. Other than that, I'm okay."

"Will he come back?" moaned the girl the werewolf had cornered.

"I don't know," Dan admitted. "Thanks to Sheilah he had a nasty shock, so he may be hurt and scared and lying low. Or he may be pretty darn mad and waiting till his eyes clear up to make another attack. Don't forget his high metabolic rate; he's probably extremely hungry about now."

"If he's really frightened of us he may not come back," I said. "He may look for easier prey outside the compound."

Dan blanched, his eyes growing wide. "Oh, God, that's right! We've got to get the front gate closed!"

He thought for a minute. "Bill, I'm going to get one of my guns and let the dogs out. If Victor is heading for the gate we may be able to turn him back and harrass him until he passes out for lack of food. Will you go with me?"

I'd been afraid he'd ask something like that, but I didn't want him to face the lycanthrope alone, so I agreed.

"Good," Dan said. "Hank, Sheilah, when I see Victor I'll fire three shots in succession—that'll be your signal to take my other gun and hightail it to the parking lot. Get a car and drive out to the gate. Shut it from the outside and wait till the cops get here. Uh, Ted, Mark, maybe you better go with them. If Victor gets away from Bill and me he may not readily attack a group. Okay, Bill, let's get this over with."

We ran out the back entrance. The Moon was directly overhead and the stars were bright, so we could see fairly well. So could anything else out here, a thought I tried to suppress.

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The dogs were delighted to see us, and demonstrated their joy in the usual canine fashion. "Shut up, you damn fools!" Dan whispered hoarsely. "The key—where's the damn key?" He ran through an enormous ring of keys with what seemed agonizing slowness.

"For God's sake, get that kennel open!" I whispered hysterically. "He could show up any second!"

And right on cue the dogs fell silent before shifting to a hackle-raising chorus of barks and snarls. A black shape separated from the surrounding darkness and hurled Dan to the ground. A wolflike muzzle stabbed at his throat. "Victor, Victor, it's me!" Dan screamed.

I am neither young nor especially brave, but I found myself jumping upon the monster's back. I threw both arms around his neck and, sobbing with terror, tried to pull him away from my friend. Then I was flying over the werewolf's head. I landed heavily on the ground. As I saw the lycanthrope leaping at me, I could only throw up my arms as a feeble defense. Powerful jaws closed on my right arm; I could hear my bones break.

I remember events after that with surprising clarity. Dan's rifle fired, and the werewolf screamed the ululating cry I had heard on the videotape. The kennel gate flew open and four snarling German shepherds shot at the monster. Victor roared back and slashed at them with his taloned hands. One of the dogs leaped at his throat; Victor's claws ripped into its chest and abdomen, and he dashed the disemboweled animal to the ground, where it gasped and whined weakly. The other three dogs, however, pressed their attack with increased ferocity and the werewolf began to give ground. Dan fired again and the creature howled in agony and clutched his shoulder; he turned and ran, the dogs harrying his heels.

The pack and its quarry disappeared around the side of the building, and somehow I got to my feet and followed in time to see the bloody conclusion. The German shepherds had backed the werewolf against the fence of the concrete pool and countered every attempt to break away; his roars and their barking were creating a hideous racket. Suddenly Victor turned his back to the dogs, crouched, and straightened his body in a powerful leap that carried him over the fence. He splashed into the water.

"No, Victor!" Dan yelled as we ran toward the pool.

At first the lycanthrope stood silently in the breast-deep water, panting heavily. Then he saw the fishes. He snarled a warning as a small one nosed by him, but when another took an exploratory snap at his leg he yelped and thrust a hand into the water, dragging out a wriggling four-footer and biting it behind the head. Then a bigger shark attacked, and after that it was all over. The largest fish slammed into

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him with a force that knocked him off his feet; the water roiled as the two monsters thrashed about. Dan emptied his rifle into the fishes, and a technician attempted to fend them from the werewolf with a long pole. After several minutes all the sharks were dead.

We finally managed, after several nervous and unsuccessful tries, to pull the werewolf from the pool. He was still alive, but too weak to do more than feebly growl at his rescuers. He died shortly afterward. Then amid the confusion of shouting people and barking dogs Dan was at my side, asking about my arm. For the first time I looked at it. I promptly fainted.

There isn't much left to tell. Count Tormany was surprisingly understanding about the death of his son. In a quiet ceremony attended by Tormany, myself, and the entire Marine Lab staff, the lycanthropic body of Victor Tormany was buried in a grave on a wooded hill near the laboratory.

My wife joined me soon after the funeral. I resigned my university position for reasons of health, and we moved to a small apartment in a town near the lab. Even though I had lost my teacher's salary, our financial position was immensely improved. for Dan's grant proposal, which was very handsomely funded, provides an extremely tidy salary for me—in fact, I get more than anybody else, including Dan.

If you know anything about the old lycanthropy legends, it's obvious why this is so. Although I'm a slightly overweight, balding, middle-aged man, I can tell from videotapes that I make a rather impressive werewolf. Not so ferocious as young Tormany was, but still quite adequate, thank you. It's a nuisance to have to check into the lab for an overnight stay once a month, and if I were conscious of what goes on I'd be acutely embarrassed. The rest of the time, though, I can live a reasonably normal life, and I must say that I'm more personally involved with my research than ever before.

The Northeastern Marine Biological Laboratory continues to specialize in oceanographic research, but the administration has made several accommodating changes in the way the lab is run in order to facilitate our studies of lycanthropy. For example, a triple fail-safe backup electrical system has been constructed, and at my insistence the ichthyologist is observing his damn sharks at an affiliated laboratory fifty safe miles away. The administration hopes to score really big on publicity as a result of Dan's project.

I think we're close to finding a cure for lycanthropy, and I am increasingly convinced that its mechanism is indeed biochemically similar to that involved in many kinds of cancer. So the personal sacrifices, although great, are worth it, in my opinion. Besides—when's the last time a werewolf won the Nobel Prize for Medicine? ■

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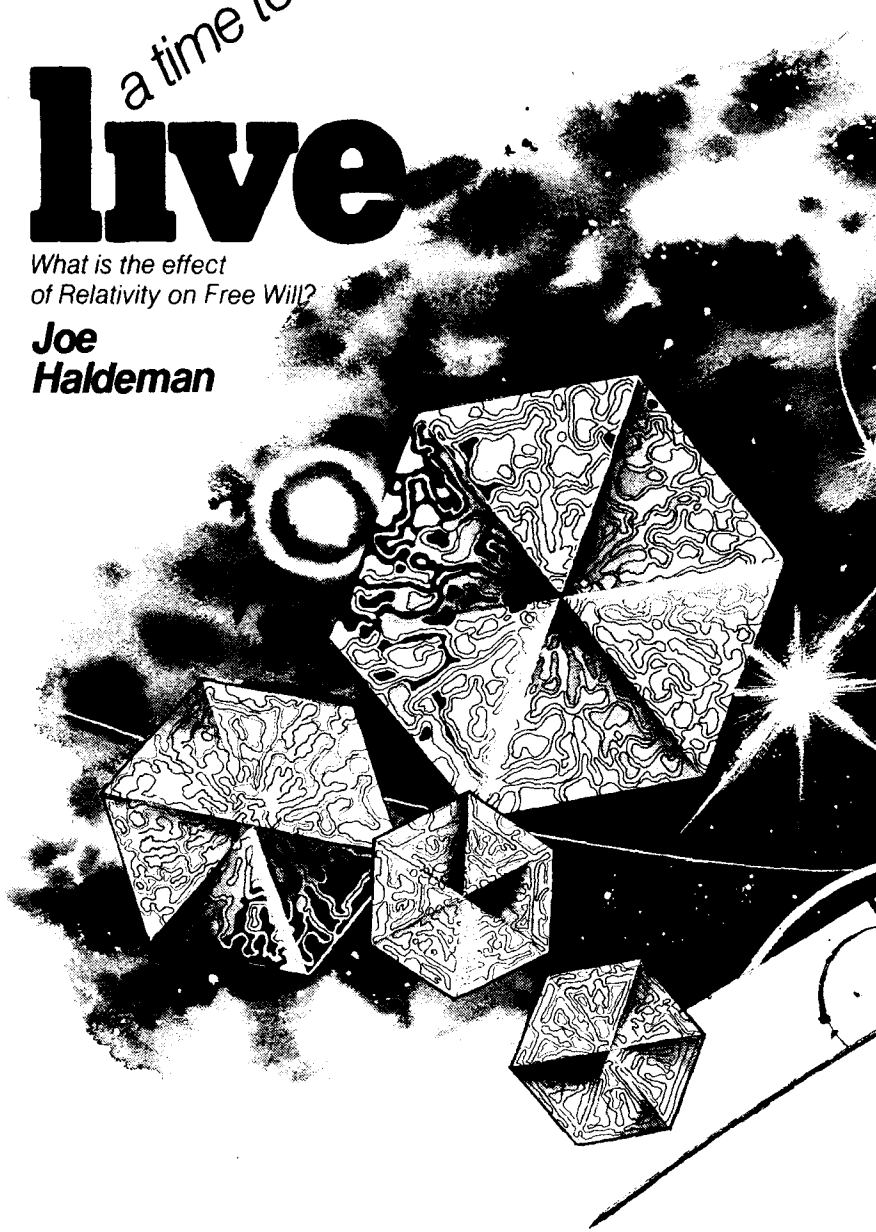
a time to live

What is the effect of Relativity on Free Will?

Joe Haldeman



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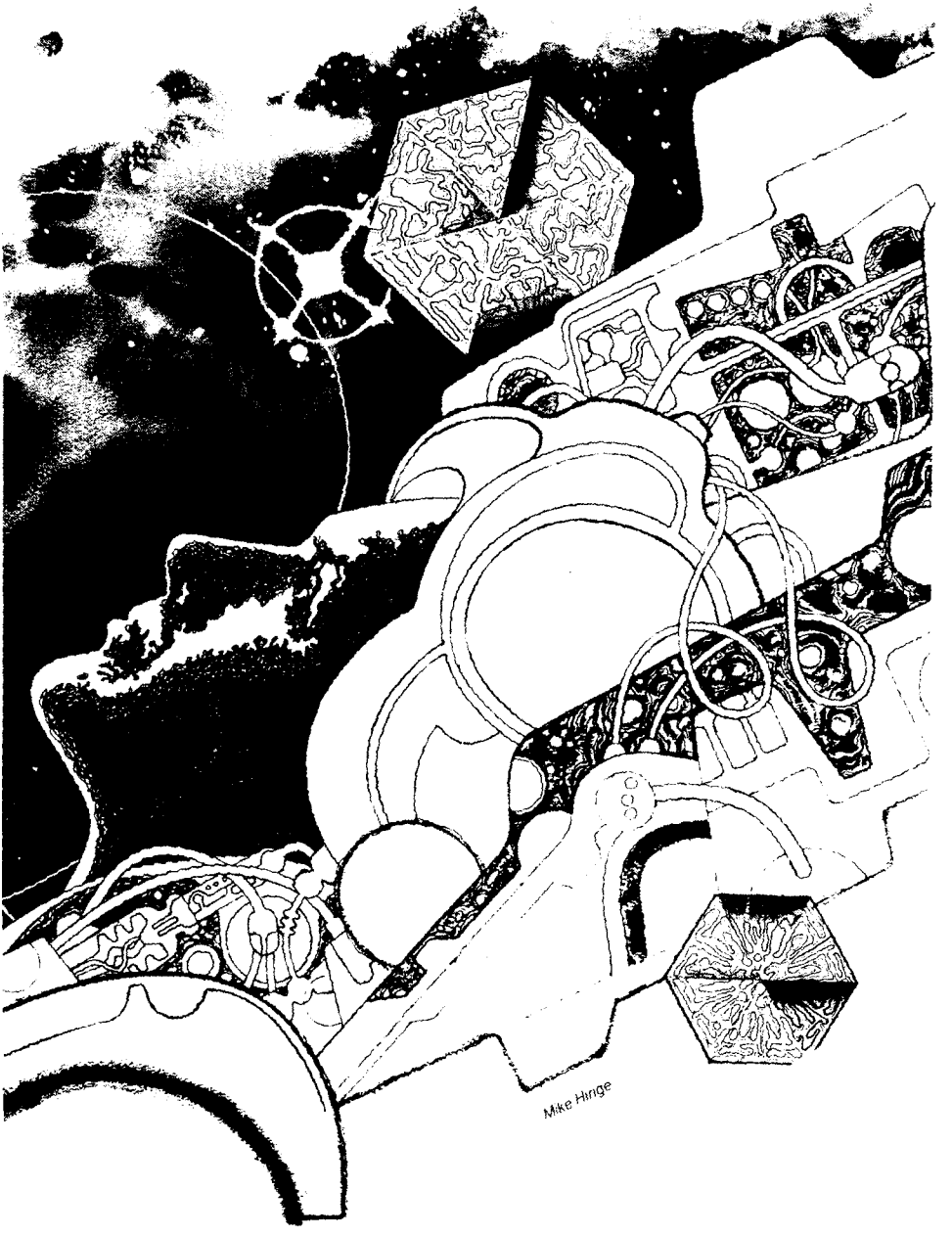

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The Man Who Owns the Moon, they called him while he was alive, and The Man Who Owned the Moon for some time thereafter. D. Thorne Harrison:

Born 1990 in a mean little Arkansas strip-mining town. Formal education terminated in 2005, with his escape from a state reformatory. Ten years of odd jobs on one side of the law or the other. Escalating ambition and power; by the age of thirty-five, billionaire chairman of a diversified, mostly legitimate, corporation. Luck, he called it.

One planet was not enough. About a week before his fortieth birthday, Harrison fired his board of directors and liquidated an awesome fortune. He sank every penny of it into the development and exploitation of the Adams-Beeson drive. Brought space travel to anyone who could afford it. Bought a chunk of the Moon to give them someplace to go. Pleasure domes, retirement cities, safaris for the jaded rich. Made enough to buy the votes to initiate the terraforming of Mars.

As the first trickle of water crawled down the Great Rift Valley, Harrison lay in his own geriatrics hospital, in Copernicus City, in his hundred and twentieth year. The excitement may have hastened his passing.

"Move it move it *move* it!" Down the long white corridor two orderlies pushed the massive cart, drifting in long skips in the lunar gravity, the cart heavy with machines surrounding a frail wisp of a human body: dead cyborg of D. Thorne Harrison. Oxygenated fluorocarbon coursing through slack veins, making the brain think it still lived.

Through the bay doors of the cryonics facility, cart braked to a bumpy stop by the cold chamber, tubes and wires unhooked and corpse slid without ceremony inside. Chamber locked, pumped, activated: body turned to cold quartz.

"Good job." Not in the futile hope of future revival.

The nuts had a field day.

Harrison had sealed his frozen body into a time/space capsule, subsequently launched toward the center of the Galaxy. Also in the capsule were stacks of ultrafiche crystals (along with a viewer) that described humankind's nature and achievements in exhaustive detail, and various small objects of art.

One class of crackpots felt that Harrison had betrayed humanity, giving conquering hordes of aliens a road map back to Earth. The details of what they would do to us, and why, provided an interesting refraction of the individual crackpot's problems.

A gentler sort assumed *a priori* that a race of aliens able to decipher the message and come visit us must necessarily have evolved away from aggression and other base passions; they would observe; perhaps help.

Both of these groups provided fuel for solemn essays, easy master's

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theses, and evanescent religions. Other opinions:

"Glad the old geezer got to spend his money the way he wanted to."

"Inexcusable waste of irreplaceable artistic resources."

"He could have used the money to feed people."

"Quixotic gesture; the time scale's too vast. We'll be dead and gone long before anybody reads the damned thing."

"I've got more important things to worry about."

None of the above is true.

Supposedly, the miniature Adams-Beeson converter would accelerate the capsule very slowly for about a century, running out of fuel when the craft had attained a small fraction of the speed of light. It would pass the vicinity of Antares in about five thousand years.

The capsule had a preprogrammed signal generator, powered by starlight. It would accumulate power for ten years at a time, then bleat out a message at the 21-centimeter wavelength. The message lasted ninety minutes and would be repeated three times; any idiot with a huge radio telescope and the proper ontological prejudices could decode it: "I am an artifact of an intelligent race. My course is thus and so. Catch me if you can."

Unfortunately, the craft carried a pretty hefty magnetic field, and ran smack-dab into Maxwell's Equations. Its course carried it through a tenuous but very extensive cloud of plasma, and through the years it kept turning slowly to the right, decelerating. When it came out of the cloud it was pointed back toward the Earth, moving at a very modest pace.

In twenty thousand years it passed the place where Earth had been (the Sun having wandered off in the natural course of things) and continued to crawl, out toward the cold oblivion between the galaxies. It still beeped out its code every decade, but it was a long time before anybody paid any attention.

I woke up in great pain, that didn't last.

"How do you feel?" asked a pretty young nurse in a starched green uniform.

I didn't answer immediately. There was something wrong. With her, with the hospital room, the bed. The edges were wrong. Too sharp, like a bad matte shot at the cubies.

"How do you feel?" asked a plain, middle-aged nurse in a starched green uniform. I hadn't seen the change. "Is this better?"

I said it didn't make much difference. My body, my body was a hundred years younger. Mind clear, limbs filled with springy muscle. No consciousness of failing organs. I am dead, I asked her; told her.

"Not really," she said and I caught her changing: shimmer*click*. Now a white-haired, scholarly-looking doctor, male. "Not any more. You were dead, a long time. We rebuilt you."

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I asked if he/she would settle on one shape and keep it; they pulled me out of a capsule, frozen solid?

"Yes. Things went more or less as you planned them."

I asked him what he meant by more or less.

"You got turned around, and slowed. It was a long time before we noticed you."

I sat up on the bed and stared at him. If I didn't blink he might not change. I asked him how long a time?

"Nearly a million years. 874,896 from the time of launch."

I swung to the floor and my feet touched hot sand.

"Sorry." Cold tile.

I asked him why he didn't show me his true form. I am too old to be afraid of bogeymen.

He did change into his true form and I asked that he change back into one of the others. I had to know which end to talk to.

As he became the doctor again, the room dissolved and we were standing on a vast plain of dark brown sand, in orderly dunes. The vague shadow in front of me lengthened as I watched; I turned around in time to see the Milky Way, rather bright, slide to the horizon. There were no stars.

"Yes," the doctor said, "we are at the edge of your galaxy." A sort of sun rose on the opposite horizon. Dim red and huge, nebulous at its boundaries. An infrared giant, my memory told me.

I told him that I appreciated being rebuilt, and asked whether I could be of some service. Teach them of the ancient past?

"No, we learned all we could from you, while we were putting you back together." He smiled. "On the contrary, it is we who owe you. Can we take you back to Earth? This planet is just right for us, but I think you will find it dull."

I told him that I would very much like to go back to Earth, but would like to see some of his world first.

"All of my world is just like this," he said. "I live here for the lack of variety. Others of my kind live in similar places."

I asked if I could meet some of the others.

"I'm afraid that would be impossible. They would refuse to see you, even if I were willing to take you to them." After a pause he added, "It's something like politics. Here." He took my hand and we rose, his star shrinking to a dim speck, disappearing. The Galaxy grew larger and we were suddenly inside it, stars streaming by.

I asked if this were teleportation.

"No, it's just a machine. Like a spaceship, but faster, more efficient. Less efficient in one way."

I started to ask him how we could breathe and talk, but his weary look cut me off. He seemed to be flickering, as if he were going to change shape again. But he didn't.

"This should be interesting," he said, as a yellow star grew brighter,

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then swelled to become the familiar Sun. "I haven't been here myself in ten, twelve thousand years." The blue-and-green ball of Earth was suddenly beneath us, and we paused for a moment. "It's a short trip, but I don't get out often," he said, apologetically.

As we drifted to the surface, it was sunset over Africa. The shape of the western coast seemed not to have changed much.

The Atlantic passed beneath us in a blur and we came to ground somewhere in the northeastern United States. We landed in a cow pasture. Its wire fence, improbably, seemed to be made of the same shiny duramyl I remembered from my childhood.

"Where are we?" I asked.

He said we were just north of Canaan, New York. There was a glideway a few kilometers to the west; I could find a truck stop and catch a ride. He was flickering very fast now, and even when he was visible I could see the pasture through him.

"What're you talking about?" I said. "They wouldn't, don't, have truck stops and glideways a million years in the future."

He regarded me with fading scorn and said we were only five or ten years in my future; after the year of my birth, that is. Twenty at the outside. Didn't I know the slightest thing about relativity?

And he was gone.

A farmer was walking toward me, carrying a wicked-looking scythe. There was nothing in the pasture to use it on, but me.

"Good morning," I said to him. Then saw it was afternoon.

He walked to within striking distance of me and stopped, grim scowl. He leaned sideways to look behind me. "Where's the other feller?"

"Who?" I'd almost said I was wondering that myself. "What other fellow?" I looked back over my shoulder.

He rubbed his eyes. "Damn contacts. What're you doin' on my propitty anyhow?"

"I got lost."

"Don't you know what a fence is?"

"Yes, sir, I'm sorry. I was coming to the house to ask directions to Canaan."

"Why you out walkin' with a funny costume on?" I was wearing a duplicate of the conservative business suit Harrison was buried in.

"It's the style, sir. In the city."

He shook his head. "Kids. You just go over that fence yonder," he pointed, "and head straight 'til you get to the road. Mind you don't touch the fence an' watch out for my God damn beans. You get to the road and Canaan's to the left."

"Thank you, sir." He had turned and was stumping back to the farmhouse.

In the truck stop, the calendar read 1995.

It's not easy to be penniless in

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New York City, not if you have a twenty-year-old body and over a century's worth of experience in separating people from their money.

Within a week, the man who had been Harrison was living in a high-class flat behind the protection of the East Village wall, with enough money stacked away to buy him time to think.

He didn't want to be Harrison again, that he knew for sure. Besides the boredom of living the same life over, he had known (as Harrison) by the time he was fifty that his existence was not a particularly happy one, physically addicted to the accumulation of wealth and power, incapable of trusting or being trusted.

Besides, Harrison was a five-year-old in Arkansas, just beginning the two decades of bad luck that would precede a century of nothing going wrong.

He had this sudden cold feeling.

He went to the library and looked up microfiches of the past few years' *Forbes* and *Bizweek*. And found out who he was, by omission.

For less than a thousand dollars, he gave himself a past. A few documents to match counterfeit inserts in government data banks. Then a few seemingly illogical investments in commodities, that made him a millionaire in less than a year. Then he bought a failing electronics firm and renamed it after himself: Lassiter Electronics.

He grew a beard that he knew would be prematurely white.

The firm prospered. He bought a plastics plant and renamed it Lassiter Industries. Then the largest printing

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outfit in Pennsylvania. A fishery after that.

In 2010 he contrived to be in a waterfront crap game in Galveston, where he lost a large sum to a hard-eyed boy who was fairly good at cold-rolling dice. Lassiter was better, but he rolled himself crapouts. It was two days after Harrison's twentieth birthday, and his first big break.

A small bank, then a large one. An aerospace firm. Textiles. A piece of an orbital factory: micro-bearings and data crystals. Now named Lassiter, Limited.

In 2018, still patiently manufacturing predestination, he hired young D. Thorne Harrison as a time-and-motion analyst, knowing that all of his credentials were false. It would give Harrison access to sensitive information.

By 2021 he was Junior Vice-President in charge of production. By 2022, Vice-President. Youngest member of the board, he knew interesting things about the other board members.

In 2024, Harrison brought to Lassiter's office documents proving that he had voting control of 51% of Lassiter, Limited. He had expected a fight. Instead, Lassiter made a cash settlement, perplexingly small, and dropped out of sight.

With half his life left to live, and money enough for much longer, Lassiter bought comfortable places in Paris, Key West, and Colorado, and commuted according to the weather and season. He took a few years for a leisurely trip around the world. His considerable mental energies he channeled into the world of art, rather than finance. He became an accomplished harpsichordist, and was well-known among the avant-garde for his neopointillist constructions: sculptures of frozen light, careful laser bursts caught in a cube of photosensitive gel. Beautiful women were fascinated by this man who had done so well in two seemingly antagonistic fields.

He followed Harrison's fortunes closely: the sell-out in 2030, buying out the Adams-Beeson drive (which seemed like a reckless long shot to most observers), sinking a fortune in the Moon and getting it back a hundredfold.

And as the ecologic catalyzers were being seeded on Mars, Harrison an old man running out of years to buy, Lassiter lay dying in Key West:

In the salt breeze on an open veranda, not wanting to clutter up his end with IV tubes and rushing attendants and sterile frigid air, he had sent his lone nurse away on an errand that would take too long, his last spoken words calm and reassuring, belying the spike of pain in his chest. The house downstairs was filled with weeping admirers, friends he had not bought, and as the pale blue sky went dark red, he reckoned himself a happy man, and wondered how he would do it next time, thinking he was the puppeteer, even as the last string was pulled. ■

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Vincent Di Fate

after the Festival

PART II

LICENSED TO UNZ.ORG
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How can you convince someone that he is wrong, when—in terms of his own cultural background—he is acting correctly? **George R. R. Martin**

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SYNOPSIS

Dirk t'Larien, jack-of-many-trades and interstellar wanderer, is on the planet Braque when he receives a package containing a whisperjewel, a gem that can be psionically impressed with a particular mood or emotion. This particular jewel holds the memories of his love for a woman named Gwen Delvano, with whom Dirk had been deeply involved seven years earlier, when both of them had been students on the university world of Avalon. They had had a pair of such gems esper-etched, and had exchanged them with the promise that whatever the future might bring, each would come to the other in time of need, if summoned with the jewel.

Dirk, very much an idealist during his years on Avalon, has become a tired and disillusioned man since, a man who believes in very little; the whisperjewel and its memories disturb him greatly. In the hope that Gwen is calling him back, and that with her he can once again become the sort of person he was, Dirk decides to answer the summons. He traces the whisperjewel back to the rogue planet Worlorn, and takes passage.

Worlorn is a world melancholy and abandoned, moving on a path that will someday remove it from the galaxy entirely. During a long passage through a spectacular multiple-star system, it was terraformed and made the site of a great cultural fair, the Festival of the Fringe, designed to demonstrate the strength and technological sophistication of the fourteen outworlds that lay on the far side of the interstellar gas cloud called the Tempter's Veil. The Festival was a great triumph, but it ended a decade ago, when Worlorn first began to recede from the Wheel of Fire. Today the rogue planet is habitable only by courtesy of an artificial heat-shield; its nights are black and almost starless, its days long twilights. Only a handful of people live in the fourteen great Festival cities.

Gwen, notified of Dirk's impending arrival, meets him at Worlorn's spacefield, but it is a strange, strained reunion. Dirk receives several shocks. Gwen is cool and distant; she wears a bracelet of jade and silver on her left arm, and she does not speak of why she sent the whisperjewel. Her aircar is the oddest he has ever seen, a massive armored vehicle shaped like a manta ray, or—Gwen explains—in the image of the black banshee of High Kavalaan, an aerial predator. With Gwen is a stranger, a plump Kimdissi ecologist named Arkin Ruark, who is assisting her in her study of Worlorn's wilderness. The greatest shock of all—Gwen is 'married.' Her bracelet is a sign of her union with Jaantony Riv Wolf high-Ironjade Vikary, a high-bond of Ironjade, one of the four great Kavalar holdfast-coalitions.

Dirk, confused and disappointed, returns with Gwen and Arkin Ruark to the mountain city Larteyn, built of a light-retaining rock called glowstone by the men of High Kavalaan. Gwen leaves them, and Dirk stays with Ruark that night, but he finds himself

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very restless, unable to sleep, and finally ascends alone to the roof of their tower. Jaan Vikary (as the Kavalar introduces himself) finds him up there, watching the dawn. Jaan is wearing a laser sidearm, and two bracelets—a silver-and-jade twin to Gwen's on his left arm, another of iron and glowstone on his right. He is cordial but formal. "This is not Avalon," he tells Dirk, but with his warning he gives Dirk a collar-pin shaped like a tiny banshee, as "an emblem of my friendship and concern for you." Dirk promises to wear it, and Jaan escorts him to breakfast.

Over food, Dirk meets the third member of the Kavalar household, Garse Ironjade Janacek, who wears an iron-and-glowstone bracelet that matches the one on Jaan Vikary's right arm. Janacek is Jaan's teyn*; Gwen is* betheyn *to Jaan,* cro-betheyn *to Garse. Tensions clearly exist, visible even to Dirk, the outsider. Janacek is an abrasive, aggressive knife of a man; despite Jaan Vikary's efforts to keep him under control, he insults Gwen and Dirk freely during the meal, with obvious relish. Dirk dislikes him immediately.*

After eating, Gwen takes Dirk out into the forests of Worlorn, to give him the flavor of the dying world, and a little background on her project. They travel on sky-scoots, tiny flying platforms just large enough to hold a single person. Gwen is very practiced at it, Dirk very inept. It is the first time they have been alone. When they finally land, Gwen seems to have warmed toward Dirk considerably, but she rejects him when he tries to kiss her. Then he calls her "Jenny," a private name he used for her when they were lovers on Avalon; Gwen responds with anger. She says that Dirk had always loved Jenny, a phantom whose image he had fastened on her, and never the real Gwen Delvano; that was why she left him. She also tells him a little of Jaan's name and history, and of Kavalar naming philosophy, "Give a thing a name, and it will somehow come to be." A Kavalar is the sum of all his names, she says. However, when Dirk stubbornly asks Gwen if she is happy, she replies evasively.

Finally she takes him walking through the wilderness of Worlorn. They talk only of the plants and animals around them. But decay and death are everywhere, and Dirk soon grows depressed. They race back to Larteyn on sky-scoots, Gwen winning easily.

When Dirk returns to Arkin Ruark's rooms, he finds the Kimdissi waiting for him. They drink together and begin to talk. Ruark, unprompted, begins to answer questions Dirk has not even posed to Gwen. Deeply hostile to the Kavalars and the code duello culture of their planet, Ruark describes Jaan and Garse as violent, dangerous men who are incapable of love—their language does not even have a word for it. Kavalars use women only as slaves and breeders and status symbols, Ruark says, and that is what Gwen has become. She wants to

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escape, but is hopelessly trapped. That is why she sent Dirk the whisperjewel; he is her last chance. Dirk resolves to learn the truth of the matter and help Gwen to freedom, whether she loves him or not.

The next morning, Dirk walks into the Kavalar apartment in the middle of a raging argument. Jaan Vikary is quarreling with a huge older man, a gray-haired giant who is introduced as Lorimaar high-Braith Arkellor, a Kavalar of another holdfast. Garse Janacek and Gwen are also present. Lorimaar is complaining bitterly about young Kavalars who do not keep the old customs; he spits venom at both Dirk and Gwen. But Jaan Vikary finally forces him to back down and apologize, and Lorimaar storms out. Janacek also leaves, and Dirk demands an explanation from Jaan. Instead he gets a history lesson; Jaan is a historian by profession, and he begins to tell Dirk about his planet's long history of war, and especially about legendary demons—weres and shape-changers—called "mockmen."

Dirk, impatient, presses his point, and the truth finally comes out. Lorimaar is one of a group of very traditional Kavalars who have come to Worlorn to hunt mockmen, since the practice has been outlawed on High Kavalaan itself. Jaan and Garse, alone, are trying to stop them by reaching potential victims first, and naming them korariel*—or protected property—of Ironjade with small collar-pins. Furious, Dirk removes the pin Jaan had given him and returns it. "I am nobody's property," Dirk says. "I've been taking care of myself for a long time, and I can keep on taking care of myself." Gwen supports him, and Jaan reluctantly accepts the pin. Before leaving, however, the Kavalar tells Dirk the cause of the morning's arguments; Lorimaar had sighted Dirk the day before, and was angry at the shield of Ironjade that kept him from his mockman. Without the pin, and the threat of Ironjade dueling prowess to back it up, Dirk will be fair game for Lorimaar and the other hunters from Braith holdfast.*

CHAPTER FOUR

"I hope you will keep this confidential after you leave Worlorn," Gwen said after Jaan had gone. "Let Jaan and Garse take care of the Braiths. Above all, don't tell Arkin! He despises Kavalars, and he'd be off to Kimdiss in a shot." She stood up. "For the present, I'd suggest we talk of more pleasant things. We have a short time together—I can only be your tour guide so long before I have to return to my work. There is no reason to let those Braith butchers spoil the time we have."

"Whatever you say." Dirk answered. "You have something planned?"

"Today I think we should play it safe. We don't want to pour *too* much salt into Lorimaar's wound, or he and his fat *teyn* might hunt us both and Jaan be damned. Today I'll

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show you the other cities. They have a fascination, too, and a kind of macabre beauty."

"All right," Dirk said, with little enthusiasm.

Gwen dressed quickly and took him up to the roof. The sky-scoots still lay where they had discarded them a day earlier. Dirk bent to retrieve them, but Gwen took the silver-metal tissues from his hands and tossed them into the back of the gray manta aircar. "No scoots today," she said. "We'll be covering too much ground."

Dirk nodded, and both of them vaulted over the car's wings into the front seat.

They spent the daylight hours in flight, moving from one city to the next, hundreds of kilometers away; like a restless metal insect, their aircar flew on, visiting the bright urban flowers of Fringe technology, each in turn.

But everywhere they found the flowers wilted.

They saw Twelfth Dream, the gracious pastel city built by Kimdiss, a city of pink marble and pale stone, stained glass and polished wood; a city of gardens and art, living tree-sculptures and sidewalk murals. But the gardens were all desolate and overgrown, the tree-sculptures had grown into grotesque shapes their creators never dreamed of, and the only sound was the rustling whispers of dead leaves blown by the wind.

They moved on to Musquel-by-

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the-Sea, built along the shore of a jagged bay where green waves crested to break against rotting wharfs. Musquel was a brick city; bricks red and blue and green and yellow, bricks of every color, slammed together with mortar as black as obsidian in crazy clashing patterns. But the bricks were crumbling; as their aircar swept low through the cobbled streets, choking clouds of multicolored dust rose everywhere in their wake. The builders, Gwen told him, were the fisherfolk of the Forgotten Colony, which is sometimes called Letheland by the other outworlders and is always called Earth by its own people. The Lostfolk were a solitary race, she said, with no interest in the rest of space; their past was a mystery. Wolfheim and Tober had dragged them to the Festival, but they came reluctantly, and left quickly when Fat Satan began to recede.

Nor were they the only people gone, as Dirk saw when Gwen took him to the other cities. The chaotic sprawl called Hłapala's City only faintly echoed the wild vitality of the Wolfmen who had built it: the frailer buildings were already falling into ruin. Bern-ager-Daw, the Toberian metropolis, was even more ghostly. The force screens that had been half the city's substance had died, and now the strange-shaped buildings looked incomplete. Esvoch, city of Eshellin, was desolate and barely standing; the winds had savaged its soft stone buildings, eating great holes everywhere, and collapsing the tallest halls.

Ghosts everywhere, everywhere. If Larteyn was a dying city, Dirk thought, then these were dead ones. It was near dusk when he turned to Gwen. "Is Larteyn the only city with any life at all?" he asked.

"No," she said. "No, I'll show you life now, if you'd like. Come on."

It was a city of light, its flanks metallic and windowless and shimmering with white-hot brilliance. Corruscating, flashing, the light climbed the vaulting shaft in waves, beginning at the far bottom where the city was anchored, deep into the primal rock, then climbing and climbing and growing steadily brighter as the city rose and narrowed like the vast needle it was. Faster and higher the wave of light would ascend, up all that incredible climb, until it reached that cloud-crusted silver spire like a burst of blinding glory. And by then, three later waves had already begun to follow it up.

"Challenge," Gwen named the city as they approached. Its name and its intent. It was built by the urbanites of ai-Emerel, whose home cities are black steel towers set amid rolling plains. Each Emereli city was a nation-state, all in a single tower, and most Emereli never left the building they were born in. Challenge was all those Emereli towers in one, silver-white instead of black, twice as haughty and three times as tall, ai-

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Emerel's arcological philosophy embodied in metal and plastic; fusion-powered, automatic, computerized, and self-repairing. The Emereli boasted that it was immortal.

There were dark horizontal slashes in the body of the city; airlot landing decks, each ten levels from the last. Dirk homed in on one, and the black slit blazed into light for his approach. The opening was easily ten meters high; he had no trouble setting themselves down in the vast airlot on the hundredth level.

As they climbed out, a deep bass voice spoke to them from nowhere. "Welcome," it said. "I am the Voice of Challenge. May I entertain you?"

Dirk glanced back over his shoulder, and Gwen laughed at him. "The city brain," she explained. "A supercomputer. I told you this city still lived."

"May I entertain you?" the Voice repeated.

"Maybe," Dirk said tentatively. "I think we're probably hungry. Can you feed us?"

The Voice did not answer, but a wall panel rolled back several meters away and a silent cushioned vehicle moved out and stopped before them. They got in and the vehicle moved off, through another obliging wall. They rolled on soft balloon tires through a succession of spotless corridors, past rows of numbered doors, while music played soothingly around them.

The car let them off at a restaurant, and a robowaiter offered them menus and wine lists. They mulled the selection for a long time. Finally Dirk chose sand-dragon, broiled in butter, from Jamison's World, and Gwen ordered bluespawn-in-cheese, from Old Poseidon.

The wine they picked was clear and white. Dinner came on warm plates of silver and bone. All around them, empty but immaculate, other tables sat waiting with dark red tablecloths and bright silver dinnerware. The customers were gone a decade ago; but the Voice and the city had infinite patience.

Afterwards, over coffee, Dirk felt mellow and relaxed, perhaps more at ease than he had been since coming to Worlorn. Jaan Vikary and the silver-and-jade—it gleamed dark and beautiful in the dim lights of the restaurant, exquisitely wrought yet oddly drained of menace and meaning—had shrunk somehow in importance, now that he was back with Gwen. Across from him, sipping from a white china mug and smiling her dreamy faraway smile, she looked very approachable, very like the Jenny that he had known and loved once, the lady of the whisper-jewel.

"Nice," he said, nodding, meaning everything around them.

And Gwen nodded back at him. "Nice," she agreed, smiling, and Dirk ached for her, Guinevere of the wide green eyes and the endless black hair, she who had cared, his lost soulmate.

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He leaned forward, and stared down into his cup. "Is there anything left, Gwen?"

She regarded him levelly, and sipped at her coffee. "Not a fair question, Dirk, you know that. There is always something left. If what you had was real to begin with. If not, well, then it doesn't matter. But if it was real, then something, a chunk of love, a cup of hate, despair, resentment, lust. Whatever. But something."

"Yes," he said. "I guess." His eyes came up. "I've got a lot left, Gwen. Love, hate, resentment, all of that. Like you said. Lust." He laughed.

She only smiled. "Sad," she said.

He was not willing to let it go. "And you? Something, Gwen?"

"Yes. Can't deny it. Something. And it's been growing, off and on."

"Love?"

"You're pressing," she said gently, setting down her cup. The robowaiter at her elbow filled it again.

"I have to," he said. "Once, I tried to start it all again. Remember? Just afterwards. I sent you my whisperjewel. You never answered, never came." His voice was even, with a faint tinge of reproach and regret, but no anger.

"Did you ever think why?" Gwen said. "I got the jewel and cried. I was still alone then, hadn't met Jaan yet, and I wanted someone so badly. I would have gone back to you, if you'd called *me*."

"I did call you. You didn't come."

A grim smile. "Ah, Dirk. The whisperjewel came in a small box, and taped to it was a note. *Please*, the note said. *Come back to me, now. I need you, Jenny*. That was what it said. I cried and cried. If you'd only written Gwen, if you'd only loved *Gwen*, me. But no, it was always Jenny, even afterwards, even then."

Dirk remembered. "Yes," he admitted after a short silence. "I guess I did write that. I'm sorry. I never understood. Is it too late?"

"I said so. In the woods. Too late, Dirk, it's all dead. You'll hurt us if you press."

"*All* dead? You said something was left, and growing. Just now you said it. Make up your mind, Gwen. I don't want to hurt you, or me. But I want . . ."

"I know what you want. It can't be. It's gone."

"Why?" he asked. He pointed across the table at her bracelet. "Because of that? Silver-and-jade forever and ever, is that it?"

"Maybe," she said. Her voice faltered, uncertain. "I don't know. We . . . that is, I . . ."

"I know it's not easy to talk about," he said carefully, gently. "And I promised to wait. But some things can't wait. You said Jaan is your husband, right? What is Garse? What does *bethevn* mean?"

"Heldwife," she said. "But you don't understand. Jaan is different than other Kavalars, stronger and wiser and more decent. He is changing things, he alone. The old ties, of

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betheyn to highbond, our ties are not like that. Jaan doesn't believe that, no more than he believes in hunting mockmen."

"He believes in High Kavalaan," Dirk said, "and in code duello. Maybe he's atypical, but he's still a Kavalar."

"Pfui," she said. "Now you sound like Arkin."

"Do I? Maybe Arkin is right, though. One other thing. You say Jaan doesn't believe in many of the old ways, right?"

Gwen nodded.

"Fine. What about Garse, then? Garse is equally enlightened, no doubt?"

That stopped her. "Garse," she began. "Well, Garse is more conservative."

"Yes," said Dirk. Suddenly he seemed to have it all. "Yes, I think he is, and that's a big part of your problem, isn't it? You may love Jaan but you don't care for Garse Janacek all that damn much, do you?"

"I feel a lot of affection for . . ."

"*Do* you?"

Gwen's face went hard. "Stop it," she said.

Her voice frightened him. He drew back, suddenly and sickeningly aware of the way he had been leaning across the table, pressing, pushing, jabbing, attacking, and taunting her, he who had come to care and to help. "I'm sorry," he blurted.

Silence. She was staring at him, her lower lip trembling, while she drew herself together and gathered strength. "You're right," she finally said. "Partly, anyway. I'm not—well—not entirely happy with my lot." She gave a forced chuckle. "I guess I fool myself a lot. I wear the jade-and-silver, and tell myself I'm more than a heldwife, more than other Kavalar women. Why? Just because Jaan says so? Jaan Vikary is a good man, Dirk, really he is, in many ways the best man I have ever known. I did love him, maybe I still do. I don't know. I'm very confused right now. But whether I love him or not, I owe him. Debt and obligation, those are the Kavalar bonds, love is only something Jaan picked up on Avalon—I'm not quite sure he's mastered it yet, either. I would have been his *teyn*, if I could. But he already had a *teyn*. Besides, not even Jaan would go that far against the customs of his world. You heard what he said about the duels - and all because he searched some old computer banks and found out one of their Kavalar folk heroes had tits." She smiled grimly. "Imagine what would happen if he took me to *teyn*! He would lose everything, just everything. Ironjade is relatively tolerant, yes, but it will be centuries before any holdfast is ready for that. No woman has ever worn the iron-and-glowstone."

"Why?" Dirk said. "I don't understand. All of you keep making these comments—about breeding women and heldwives and women hiding in caves afraid to come out, all that stuff. And I keep not quite believing

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it. How did High Kavalaan get so twisted up anyway? Tara is normal enough, last time I looked. What do they have against women? Why is it so critical that the founder of Ironjade was female? Lots of people are, you know."

Gwen gave him a wan smile and rubbed her temples gently with her fingertips, as if she had a headache she were hoping to massage away. "You should have let Jaan finish," she said, "then you'd know as much as we do. He was only warming up. He hadn't even gotten to the Sorrowing Plague, you know." She sighed. "It is all a very long story, Dirk, and right now I don't have the energy. Wait till we get back to Larteyn. I'll hunt up a copy of Jaan's thesis and you can read it all for yourself."

"All right," Dirk said. "But there are a few things I'm not going to be able to read in any thesis. A few minutes ago you said you weren't sure if you loved Jaan anymore. You certainly don't love High Kavalaan. I think you hate Garse. So why are you doing all this to yourself?"

"You have a way of asking nasty questions," she said sourly. "But before I answer, let me correct you on a few points. I may hate Garse, as you say. Sometimes I'm quite sure that I hate Garse. At other times, however—I wasn't lying before, when I told you that I feel considerable affection for him. When I first arrived on High Kavalaan, I was as dewy-eyed and vulnerable as I could be. Jaan had explained everything to me beforehand, of course, very patiently, very thoroughly, and I had accepted it. I was from Avalon, after all, and you can't get more sophisticated than Avalon, can you? Not unless you're an Earther. I was very wise, I thought.

"But I wasn't ready for the Kavalars, oh no. As long as I live I will never forget a second of the fear and the trauma of my first day and night in the holdfasts of Ironjade, as Jaan Vikary's *betheyn*. Especially the first night." She laughed. "Jaan had warned me, of course, and—hell—I just wasn't ready to be *shared*. What can I say? It was bad, but I lived. Garse helped. He was honestly concerned for me, and very much for Jaan. You might even say he was tender. I confided in him; he listened and cared. And the next morning, the abuse started. I was frightened and hurt, Jaan was baffled and gloriously angry—he threw Garse halfway across the room the first time he called me *betheyn*-bitch. Garse was quiet for a little while after that. He rests fairly often, but he never stops. He is truly remarkable, in a way. He would challenge and kill any Kavalar who insulted me half so badly as he does. He knows that his jokes enrage Jaan, and provoke terrible quarrels—or at least they did; by now Jaan has become dulled to it all. Yet Garse persists. Maybe he can't help himself, or maybe he honestly loathes me, or maybe he just enjoys inflicting pain. If so, I haven't given him much joy

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these past few years—one of the first things I decided was that I wasn't going to let him make me cry anymore. I haven't. I just smile and grit my teeth and try to think of something unpleasant to say back to him. Once or twice I've managed to throw him off his stride. Usually he leaves me feeling like a crushed bug.

"Yet, in spite of everything, there are *other* moments as well. Truces, little ceasefires in our never-ending war, times of surprising warmth and compassion. Many of them at night. They always shock me when they come. They're too intense. Once, believe it or not, I told Garse I loved him. He laughed at me. He did not love me, he said loudly, rather I was *cro-betheyn* to him and he treated me as he was obliged to treat me by the bond that existed between us. That was the last time I even came close to crying."

"How the hell did you ever get involved in a situation like this, Gwen?" Dirk demanded. "You must have had some idea what it would be like."

She shrugged. "I lied to myself," she said, "and I let Jaan lie to me, although I think he honestly believed all the lovely falsehoods he told me. If I had it to do over—but I don't. I was ready for him, Dirk, and I needed him, and I loved him. And he had no fire-and-iron to give me, that he had given already, so he gave me jade-and-silver, and I took it just to be near him, with only the vaguest knowledge of what it meant. I'd lost you not long before. I didn't want Jaan to go as well. So I put on the pretty little bracelet and said very loudly *I-am-more-than-betheyn*, as if that made a difference. Give a thing a name and it will somehow come to be. To Garse, I am Jaan's *betheyn* and his *cro-betheyn* and that is all, the names define the bonds and duties, what more could there possibly be? To every other Kavalar it is the same. When I try to grow, to step beyond the name, Garse is there, angry, shouting *betheyn*! at me. Jaan is different, only Jaan, and sometimes I can't help myself and I begin to wonder how *he* really feels."

Her hands came up on the tablecloth and became two fists, side by side. "The same damn thing, Dirk. You wanted to make me into Jenny, and I saved myself by rejecting the name. But like a fool I took the jade-and-silver, and now I am heldwife and all the denials I can utter won't change that. *The same damn thing*!" Her voice was shrill, her fists clutched so tightly the knuckles were turning white.

"We can change it," Dirk said quickly. "Come back to me." He sounded inane, hopeful, despairing, triumphant, concerned; his tone was everything at once.

At first Gwen did not answer. Finger by finger, very slowly, she unclenched her fists and stared at her hands solemnly, breathing deep breaths, turning her hands over and over again as if they were some

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strange artifacts that had been set before her for inspection. Then she put them flat on the table and pushed, rising to her feet. "Why?" she said, and the calm control had come back to her voice. "Why, Dirk? So you can make me Jenny again? Is that why? Because I loved you once, because something may be left?"

"Yes! No, I mean. You confuse me." He rose too.

She smiled. "Ah, but I loved Jaan once also, more recently than you. And with him, now, there are other ties, all the obligations of jade-and-silver. With you, well, only memories, Dirk." When he did not reply—she stood, and waited—Gwen started toward the door. He followed her.

The Voice had their car waiting for them. Gwen told it to take them back to the skydeck, and it set off through corridors that suddenly swam with cheerful colors and happy music. "The damn computer registered tension in our voices," she said, a little angrily. "Now it's trying to cheer us up."

"A lot of effort for two people," Dirk said.

"Voice!" Gwen said. "How many people live in Challenge today?"

The walls answered. "Presently I have three hundred and nine legal residents, and forty-two guests, including yourselves. You may, if you wish, become residents. The charge is quite reasonable."

"Three hundred nine?" Dirk said. "Where?"

"Challenge was built to hold twenty million," Gwen said. "You can hardly expect to run into them, but they're here. In the other cities as well, though not as many as in Challenge. The living is easiest here. The dying will be easy, too, if the high-bonds of Braith ever think to begin hunting the cities instead of the wild. That has always been Jaan's great fear."

"Who are they?" Dirk demanded, curious. "How do they live? Doesn't Challenge lose a fortune every day?"

"Yes. A fortune in energy, wasted, squandered. But that was the point, of Challenge and Larteyn and the whole Festival. Waste, defiant waste, to prove that the Fringe was rich and strong, waste on a grand scale such as the manrealm had never before known, a whole planet shaped and then abandoned. You see? As for Challenge, well, if truth be known, its life is all empty motion now. It powers itself from fusion reactors and throws off the energy in fireworks no one sees. It harvests tons of food every day with its huge farming mechs, but no one eats except the handful—hermits, religious cults, lost children turned savage, whatever dregs remain from the Festival. It still sends a boat to Musquel every day, to pick up fish. There are never any fish, of course."

"The Voice doesn't rewrite the program?"

"Ah, the crux of the matter! The Voice is an idiot. It can't really think, can't program itself. Oh, yes, the

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Emereli wanted to impress people, and the Voice is big, to be sure. But really it's very primitive, compared to the Academy computers on Avalon or the Artificial Intelligences of Old Earth. It does what it was told, and the Emereli told it to go on, to withstand the cold as long as it could. It will."

She looked at Dirk. "Like you," she said, "it keeps on long after its persistence has lost point and meaning, it keeps on pushing–for nothing–after everything is dead."

"Oh?" said Dirk. "But, *until* everything is dead, you have to push. That's the point, Gwen. There is no other way, is there? I rather admire the city, even if it is an overgrown idiot like you say."

"You would."

"There's more," he said. "You bury everything too soon, Gwen. Worlorn may be dying, but it isn't dead yet. We don't have to be dead either. What you said back at the restaurant, about Jaan and me, I think you should think about it: Decide what's left, for me, for him. How heavy that bracelet weighs on your arm"–he pointed–"and what name you like best, or rather who is more likely to give you your *own* name. Then tell me what's dead, and what's alive!"

She looked at him, saying nothing, until they reached the skydeck where their aircar waited.

Then she got out. "When the four of us chose where we would live on Worlorn, Garse and Jaan voted for Larteyn and Arkin for Twelfth Dream," she said. "I voted for neither. Nor for Challenge, for all its life. I don't like living in a warren. You want to know what's dead and what's alive? Come, then. I'll show you *my* city."

The city of the night was vast and intricate, with only a few scattered lights to pierce the darkness it was set in, as a pale jewel is set on soft black felt. Alone among the cities, it stood in the wild beyond the mountainwall, and it belonged there, in the forests of chokers and ghost trees and blue widowers. From the dark of the wood, its slim white towers rose wraithlike toward the stars, linked by graceful spun bridges that glittered like frozen spiderwebs. Low domes stood lonely vigils amidst a network of canals whose waters caught the tower lights and the twinkle of infrequent, far-off stars, and ringing the city were a number of strange buildings that looked like thin-fleshed angular hands clutching up at the sky. The trees, such as there were, were outworld trees; there was no grass, only thick carpets of dimly-glowing phosphorescent moss.

And the city had a song.

It was like no music Dirk had ever heard. It was eerie and wild and almost inhuman, and it rose and fell and shifted constantly. It was a dark symphony of the void, of starless nights and troubled dreams. It was made of moans and whispers and howls, and a strange low note that

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could only be the sound of sadness. For all of that, it *was* music.

Dirk looked at Gwen, wonder in his eyes. "How?"

She smiled faintly. "Darkdawn built this city, and the Darklings are a strange people. There is a gap in the mountains. Their weather wardens made the winds blow through it. Then they built the spires, and in the crest of each there is an aperture. The wind plays the city like an instrument. The same song, over and over. The weather control devices shift the winds, and with each shift, some towers sound their notes while others fall silent.

"The music—the symphony was written on Darkdawn, centuries ago, by a composer named Lamiya-Bailis. A computer plays it, they say, by running the wind machines. The odd thing about that is the Darklings never used computers much, and have very little of the technology. Another story was popular during the days of the Festival. A legend, say. It claimed that Darkdawn was a world always perilously close to the edge of sanity, and that the music of Lamiya-Bailis, the greatest of the Darkling dreamers, pushed the whole culture over into madness and despair. In punishment, they say, her brain was kept alive, and can now be found deep under the mountains of Worlorn, hooked up to the wind machines and playing her own masterpiece over and over, forever." She shivered. "Or at least until the atmosphere freezes. Even the weather wardens of Darkdawn can't stop that."

"It's . . ." Dirk, lost in the song, could find no words. "It fits, somehow," he finally said. "A song for Worlorn."

"It fits now," Gwen said. "It's a song of twilight and the coming of night, with no dawn again, ever. A song of endings. In the high day of the Festival, the song was out of place. Kryne Lamiya—that was the city's name, Kryne Lamiya, although it was often called the Siren City in much the same way that Larteyn was called the Firefort—well, it was never a popular place. It looks big, but it isn't really. It was built to house only a hundred thousand, and it was never more than a quarter full. People said the song disturbed them."

Dirk was looking at the fairy spires and listening to them sing.

"Do you want to land?" Gwen asked.

He nodded, and she spiraled down. They found an open landing slit in the side of one of the towers. Two other aircars rested there, a stub-winged red sportster and a tiny black-and-silver teardrop, both of them long abandoned. Out of curiosity, Dirk tried them both. The sportster was dead, burned-out, its power vanished years ago. But the little teardrop still warmed under his touch, and the control panel lit up and flickered, showing that a small reserve of power was left.

From the airlot, they went out into

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a long gallery where gray-and-white light murals swirled in dim patterns that matched the echoing music. Then they climbed to a balcony they had spied when coming in.

Outside, the music was all around them, calling to them with unearthly voices. Dirk took Gwen's hand in his own and listened, as he stared out across the towers and canals toward the forests beyond. The music-wind seemed to pull at him as he stood there. It spoke to him softly, urging him to jump—to end it all, all the silly and undignified and ultimately meaningless futility that he called his life.

Gwen saw it in his eyes. She squeezed his hand, and when he looked at her, she said, "During the Festival, more than two hundred people committed suicide in Kryne Lamiya. Ten times the number of any other city. Despite the fact that this city had the smallest population of all."

"Yes. I can feel it. The music."

"A celebration of death," Gwen said. "Yet, you know, the Siren City itself is *not* dead, not like Musquel or Twelfth Dream at all. It still lives, stubbornly, if only to exalt despair, and glorify the emptiness of the very life it clings to. Strange, eh?"

"Why would they build such a place? It's beautiful, but . . ."

"I have a theory," Gwen said. "The Darklings are black-humored nihilists, chiefly, and I think that Kryne Lamiya is their bitter joke on High Kavalaan and Wolfheim and

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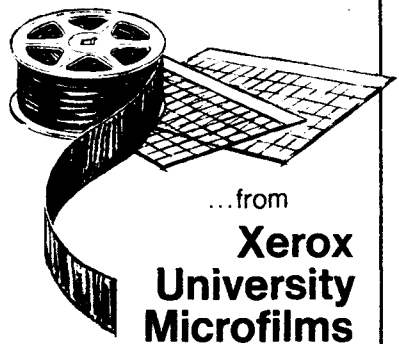

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Tober and the other worlds that pushed so hard for the Festival of the Fringe. The Darklings came, all right, and they built a city that said it was all worthless. *All* worthless—the Festival, human civilization, life itself. Think of it! What a trap for a smug tourist to walk into!" She threw back her head and began to laugh, wildly, and Dirk briefly felt a sudden irrational fear, as if his Gwen had gone mad.

"And you wanted to live here?" he said.

Her laughter faded as abruptly as it had begun; the wind snatched it from her. "Yes," Gwen said. "I wanted to live here." Four reedy spires across the canal—tied together by drooping bridges—began to ululate wildly, each note higher than the one preceding until they finally climbed into the inaudible. A drum persisted, unchanging: boom, boom, boom.

Dirk sighed. "I understand," he said. "I would live here too, I suppose, though I wonder how long I'd live if I did. Braque was a little like this, the faintest echo, mostly at night. Maybe that was why I lived *there*."

"I did want to live here," Gwen went on. "I voted . . . well, I didn't plan to vote this way, but we were talking it over when we first landed, and it just came out. It scared me. Maybe you and I are still a lot alike, Dirk. For when I come here . . . or sometimes just slow down and think a bit too long, then I wonder. It's not enough, the things I have. Not what I wanted." She turned toward him, and took the hand she held in both of hers. "Yes, I've thought of you. I've thought that things were better when you and I were together back on Avalon, and I've thought that maybe it was still *you* I loved and not Jaan, and I've thought that you and I could bring the magic back, make it all make sense again. But don't you see? It isn't *so*, Dirk, and all your pushing won't make it so. Listen to the city, listen to Kryne Lamiya, there's your truth. You think about me, and I sometimes about you, only because it's dead between us. That's the only reason it seems better. Happiness yesterday and happiness tomorrow, but never today, Dirk, it can't be, because it's only an illusion after all, and illusions only look real from a distance. We're *over*, my dreamy lost love, *over*, and that's the best thing of all, because it's the only thing that makes it *good*." She was weeping, slow quiet tears that moved trembling down her cheeks. Kryne Lamiya wept with her, the towers crying their lament. But it mocked her too, as if to say, yes, I see your grief, but grief has no more meaning than anything else, pain is as empty as pleasure. The spires wailed, thin gratings laughed insanely, and the low far-off drum went: boom, boom, boom.

Again, more strongly this time, Dirk wanted to jump off the balcony toward the pale stone and dark canals below. A dizzy fall, and then

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rest at last. But the city sang him for a fool; *rest*?, it sang, there is no rest in death. Only nothing. Nothing. Nothing. The drum, the winds, the wailings. He trembled, still holding Gwen's hands. He looked down, toward the ground below.

Something was moving down the canal. Bobbing and floating, drifting easily, coming towards him. A black barge, with a solitary pole-man. "No," he said.

Gwen blinked. "No?" she repeated.

And suddenly the words came, the words that the *other* Dirk t'Larien would have said to his Jenny, and the words were in *his* mouth, and though he was no longer quite sure that he could believe them, he found himself saying them all the same. "NO!" he said, all but shouting it at the city, throwing a sudden rage back at the mocking music of Kryne Lamiya. "Dammit, Gwen, all of us have something of this city in us, yes. The test is how we meet it. All this is frightening—," he let loose of her hands and gestured out at the darkness, the sweep of his hand taking in everything—"what it *says* is frightening, and worse is the fear you get when part of you agrees, when you feel that it's all true, that you belong here. *But what do you do about it?* If you're weak, you ignore it. Pretend it doesn't exist, you know, and maybe it'll go away. Busy yourself in the daylight with trivial tasks, and never think about the darkness outside. That's the way you let it win, Gwen. In the end it swallows you and all your trivia, and you and the other fools lie to each other blithely and welcome it. You can't be like that, Gwen, you *can't* be. You have to try. You're an ecologist, right? What's ecology all about? Life! You have to be on the side of life, everything you *are* says so. This city, this damn bone-white city with its death-hymn, denies everything you believe in, everything you are. If you're strong, you'll face it and fight it and call it by name. Defy it."

"It is no use," she said.

"You're wrong," he answered. "About this city, and about us. It's all tied up, you see? You say you want to live here? Fine! *Live* here! To live in this city would be a victory all in itself, a philosophical victory. But live here because you know that life itself refutes Lamiya-Bailis, live here and laugh at this absurd music of hers, *don't* live here and agree with this damn wailing lie." He took her hand again.

"I don't know," she said.

"I do," he said, lying.

"Do you *really* think that . . . that we could make it work again? Better than before?"

"You won't be Jenny," he promised. "Never again."

"I don't know," she repeated.

He took her face in both hands, and raised her eyes up so they looked at his. He kissed her, very lightly, the barest driest touching of their lips. "I don't know either, I guess. But maybe it would be worth trying."

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She nodded. "Maybe," she said, and nothing more. The wind blew cold and strong, the music of the Darkling madness rose and fell, and they went inside, then down the stairs past the fading, flickering walls of gray-white light, to where the solid sanity of their aircar rested, waiting to carry them back to Larteyn.

CHAPTER FIVE

They flew from the white towers of Kryne Lamiya to the fading fires of Larteyn in a lonely silence, not touching, each of them thinking their own thoughts. Gwen left the aircar in its usual place on the roof, and Dirk followed her downstairs to her door. "Wait," she said in a quick whisper, when he had expected her to say goodnight. She vanished inside; he waited, puzzled. There were noises from the other side of the door, voices—then abruptly Gwen was back, pressing a thick manuscript into his hand, an impressively heavy mass of paper hand-bound in black leather. Jaan's thesis. He had almost forgotten. "Read it," she whispered, leaning out the door. "Come up tomorrow morning, and we'll talk some more." She kissed him lightly on the cheek, and closed the heavy door with a small click. Dirk stood for a moment, turning the bound manuscript over in his hands, then turned toward the tubes.

He was only a few steps down the hall when he heard the first shout. Then, somehow, he could not continue; the sounds drew him back, and he stood listening at Gwen's door.

The walls were thick, and very little of what was said came through. The words and the meanings he lost entirely, but the voices themselves carried, and the tones. Gwen's voice dominated; loud, sharp-edged—at times she was shouting—close to the edge of hysteria. In his mind Dirk could see her, pacing the living room before the gargoyles, the way she always paced when she was angry. Both of the Kavalars would be present, berating her—Dirk was sure he heard two other voices. One quiet and sure, without anger, questioning relentlessly. That had to be Jaan Vikary. His cadence gave him away; the rhythms of his speech, distinctive even through the wall. The third voice, Garse Janacek, spoke infrequently at first, then more and more, with increasing volume and anger. After a time the quiet male voice was virtually silent, while Gwen and Garse screamed at one another. Then it said something, a sharp command. And Dirk heard a noise, a fleshy *thud.* A blow. Someone hitting someone, it could be nothing else.

Finally Vikary giving orders, followed by silence. The light went off inside the room.

Dirk stood quietly, holding Vikary's manuscript and wondering what to do. There did not seem to be anything he *could* do.

Ignoring the tubes, he walked downstairs to Ruark's rooms.

Once in bed, Dirk found he was immensely tired and badly shaken by

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the events of the day. Unable to sleep, he thought about it all for a long time. Ruark was already asleep; there was no one to talk to. Finally Dirk picked up the manuscript Gwen had given him and began to leaf through the first few pages. There was nothing like a good chunk of scholarly writing to put a man to sleep, he reflected.

Four hours and a half-dozen cups of coffee later, he put down the manuscript, yawned, and rubbed his eyes. Then he shut off the light and stared at the darkness.

Jaan Vikary's thesis—"Myth and History: Origins of Holdfast Society As Based On An Interpretation of the Demonsong Cycle of Jamis-Lion Taal"—was a worse indictment of his people than anything that Arkin Ruark could possibly say, Dirk thought. He had laid it all out, with sources and documentation from the computer banks on Avalon, with lengthy quotations from the poetry of Jamis-Lion Taal and even lengthier dissertations on what Jamis-Taal had meant. All of the things that he and Gwen had told Dirk that morning were there, in detail. Vikary supplied theories on theories, attempted to explain everything. He even explained the mockmen, more or less. He argued that during the Time of Fire and Demons, some survivors from the cities had reached the mining camps and sought shelter. Once taken in, however, they proved dangerous. Some were victims of radiation sickness; they died slowly and horribly, and possibly passed the poison on to those who nursed them. Others, seemingly healthy, lived and became part of the proto-holdfast, until they married and produced children—then the taint of radiation showed up. It was all conjecture on Vikary's part, with not even a line or two from Jamis-Lion to support it, yet it seemed a glib rationalization of the mockman myth.

Vikary also spoke, at length, of the event the Kavalars called the Sorrowing Plague—and what he carefully called "the shift to contemporary Kavalar sexual-familial patterns."

According to his hypothesis, the Hrangans had returned to High Kavalaan approximately a century after their first raid. The cities they had bombed were still slag; there was no sign of new building on the part of the humans. Yet the three slave-races they had dropped to seed the planet were nowhere in evidence; decimated, virtually extinct. Undoubtedly the Hrangan Mind commanding concluded that some of the humans still lived. To effect a final wiping-up, the Hrangans dropped plague bombs. That was Vikary's theory.

Jamis-Lion's poems had no mention of Hrangans, but many mentions of sickness. All the surviving Kavalar accounts agreed on that; there was a Sorrowing Plague, a long period when one horrible epidemic after another swept through the

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holdfasts. Each turn of the season brought a new and more dreadful disease—the ultimate demon-enemy, one the Kavalars could not fight or kill.

Ninety men died of every hundred. Ninety men, and ninety-nine women.

One of the many plagues, it seemed, was female-selective. The medical specialists Vikary had consulted on Avalon had told him that, based on the meager evidence he gave them—a few ancient poems and songs—it seemed likely the female sex hormones acted as a catalyst for the disease. Jamis-Lion Taal had written that young maids were spared the bloody wasting because of their innocence, while the rutting *eyn-kethi* were struck down horribly, and died in shuddering convulsions. Vikary interpreted this to mean that prepubescent girls were left untouched, while sexually mature women were devastated. An entire generation was wiped out. Worse, the disease lingered; no sooner did girl-children reach puberty than the plague struck. Jamis-Lion made this a truth of vast religious significance.

Some women escaped, the naturally immune. Very few at first. More later; because they lived, producing sons and daughters many of whom were also immune, while those who did not share the resistance died at puberty. Eventually all Kavalars were immune, with rare exceptions. The Sorrowing Plague ended.

But the damage had been done. Entire holdfasts had been wiped out; those that clung to life had seen their populations decline far below the numbers necessary to maintain a viable society. And the social structure and sexual roles had been warped irrevocably away from the monogamous-egalitarianism of the Taran colonists. Generations had grown to maturity in which men outnumbered women ten to one; little girls lived all their childhoods with the knowledge that puberty might mean death. It was a grim time, on that both Jaan Vikary and Jamis-Lion Taal spoke with one voice. Jamis-Lion wrote that sin had finally passed from High Kavalaan, when the *eyn-kethi* were safely locked away from the daylight, back in the caves from which they had issued, where their shame could not be seen. Vikary wrote that the Kavalar survivors had fought back as best they could; they no longer had the technological skills to construct airtight sterilized chambers, but no doubt rumors of such places had drifted down the years to them, and they still hoped that such places could be proof against disease. So the surviving women were secured in prisonlike hospitals deep under the ground, in the safest part of the holdfast, the farthest from the contaminated wind and rain and water. Men who had once roamed and hunted and warred with their wives by their sides now teamed with other men, both grieving for lost partners. To relieve the sexual tensions—and

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maintain the gene pool as best they could, if they even understood such things—the men who lived through the Sorrowing Plague made their women sexual property of all. To insure as many children as possible, they made them perpetual breeders who lived their lives safe from danger and in constant pregnancy. The holdfasts that did not adopt such measures failed to survive; those that did passed on a cultural heritage. Other changes took root as well. Tara had been a religious world, home of the Irish-Roman Reformed Catholic Church; the urge to monogamy died hard. The patterns appeared in two mutated forms; the strong emotional attachments that grew up between male hunting partners became the basis for the intense total relationship of *teyn*-and-*teyn*, while those men who desired a semi-exclusive bond with a woman created *betheyns* by capturing females from other holdfasts. The leaders encouraged such raiding. Jaan Vikary said; new women meant new blood, more children, a larger population and thus a better chance of survival. It was unthinkable that any man take exclusive possession of one of the *eyn-kethi*; but a man who could bring a woman in from outside was rewarded with honors and a seat in the councils of leadership and, perhaps most importantly, the woman herself.

These were the likely events, Vikary argued; self-evident truths that produced modern Kavalar society. Jamis-Lion Taal, wandering the face of the world many generations later, had been so much a child of his culture that he was unable to conceive of a world in which women held any status other than what he saw—when he was forced to think such thoughts, by the folklore he collected, he thought the idea intolerably wicked. Thus he rewrote all the oral literature as he cast his *Demon-song* cycle, transformed Kay Iron-Smith into a thundering giant of a man, made the Sorrowing Plague a ballad of *eyn-kethi* wickedness, and generally created the impression that the world had always been the way he found it. Later poets built on the foundations he had laid.

The forces that had produced the holdfast society of High Kavalaan had long ago vanished. Today, women and men numbered roughly the same, the epidemics were only grisly fables, most of the dangers of the planet's surface had been conquered. Nonetheless the holdfast-coalitions continued; the men fought duels and studied the new technology and worked in the farms and in the factories and sailed the Kavalar starships, while the *eyn-kethi* lived in vast subterranean barracks as sexual partners for all the men of the holdfast, laboring at whatever tasks the highbond councils deemed safe and suitable, and having babies (fewer now—Kavalar population was strictly controlled). Other women lived slightly freer lives under the protection of silver-and-jade, but not

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many. A *betheyn* had to come from outside the holdfast, which in practice meant that an ambitious youngster had to challenge and kill a highbond of another coalition, or lay claim to one of the *eyn-kethi* in an enemy holdfast and face a defender chosen in council. A man who did succeed in winning a *betheyn* immediately took his highnames and his place among the rulers; it was said that he had given his *kethi* the gift of the two bloods—the blood of death (a slain enemy), and the blood of life (a new woman). The woman enjoyed the status of silver-and-jade until such time as her highbond was killed. If he was slain by one of his own holdfast, she became an *eyn-kethi*; if the killer was an outsider, she passed to him.

Such was the status that Gwen Delvano had taken when she clasped Jaan's bracelet around her wrist.

Dirk lay awake for a long time, growing angrier the more he thought. By the time the first dawn light began to filter slowly through the window above his head, he had decided. In a sense, it no longer mattered if Gwen returned to him or not, so long as she left Vikary and Janacek and the whole sick society of High Kavalaan. But alone, she could not make the break, much as she might wish to. Very well then, Arkin Ruark was right; he would help her. He would help her to be free. And afterwards, they would have time to consider their own relationship.

Finally, his resolve fixed firmly in his mind, Dirk slept.

It was midday when he awoke, suddenly, with a snap of guilt. He sat up and blinked and remembered—he had promised Gwen that he would come up that morning, and here the morning was gone and he was still asleep. Hurriedly he rose and dressed, looked around briefly for Ruark—the Kimdissi was gone, no clue as to where or for how long—and then Dirk went up to Gwen's apartment, Vikary's thesis tucked firmly under his arm.

Garse Janacek answered his knock.

"Yes?" the red-bearded Kavalar said, frowning. He was bare to the waist, dressed only in snug-fitting black trousers and the eternal bracelet of iron-and-glowstone on his right arm. The left side of his chest, from his armpit to his breast, bore a long crooked scar, slick and hard.

Janacek saw his stare. "A duel that went wrong," he snapped. "I was too young. It will not happen again. Now, what do you require?"

Dirk flushed. "I want to see Gwen," he said.

"She is not here," Janacek said, his ice eyes hard and unfriendly. He started to shut the door.

"Wait." Dirk stopped the door with his hand.

"More? What is it?"

"Gwen. I was supposed to see her. Where is she?"

"In the wilderness, t'Larien. I would be pleased if you would

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remember that she is an ecologist, sent here by the highbonds of Ironjade to do important work. She has neglected that work for two full days to guide you hither and yon. Now, as is proper, she has returned to it. She and Arkin Ruark took their instruments and went off into the forests."

"She didn't say anything last night," Dirk insisted.

"She is not required to inform you of her plans," Janacek said. "Nor must she secure your permission for anything. There is no bond between you."

Remembering the argument he had overheard the night before, Dirk was suddenly suspicious. "Can I come in?" he said. "I want to give this back to Jaan, talk to him about it," he added, showing Garse the leather-bound thesis.

"Jaan is not presently at home. No one is here but me. I am about to leave." He reached out and snatched the thesis from Dirk's hands. "I will take this, however. Gwen should never have given it to you."

"Hey!" Dirk said. He had an impulse. "The history was very interesting," he said suddenly. "Can I come in and talk to you about it? A second or two—I won't keep you."

Abruptly Janacek seemed to change. He smiled and gave way, beckoning Dirk into the apartment.

Dirk looked around quickly. The living room was deserted, the fireplace cold, nothing seemed amiss or out of place. The dining room, visible through an open archway, was also empty. The whole apartment was very quiet.

Uncertain, Dirk wandered across the room, pausing before the mantle and its gargoyles. Janacek watched him wordlessly, then turned and left, returning shortly. He had strapped on his mesh-steel belt with its heavy holster, and was buttoning up the front of a faded black shirt when he re-entered.

"Where are you going?" Dirk asked.

"Out," Janacek replied, with a brief grin. He undid the latch-flap of his holster and drew out the laser pistol within, checked the power reading on the side of its butt, then reholstered and drew again—a smooth flowing motion with his right hand—and sighted down on Dirk. "Do I alarm you?" he asked.

"Yes," Dirk said. He moved away from the mantle.

Janacek's grin came back again. He slid the laser into its holster. "I am quite good with a dueling laser," he said, "though in truth my *teyn* is better. Of course, I must use only my right arm. The left still pains me. The scar tissue pulls, so the chest muscles on that side cannot move so far or so easily as those on my right. Yet it matters little. I am chiefly right-handed. The right arm is always more than the left, you know." His right hand rested on the laser pistol as he spoke, and the glowstones in their black iron setting shone like dim red eyes along his forearm.

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"You are not an unintelligent man, t'Larien. Nor am I. Your childish ruses do not amuse me. You have nothing to discuss with me. You simply wanted to gain admittance to this chamber, for some reasons of your own."

Dirk nodded. "All right. A lousy trick, clearly, since you saw right through it. I wanted to look for Gwen."

"I told you that she was out in the wild, at work."

"I don't believe you," Dirk said. "She would have said something to me yesterday. You're keeping me from her. Why? What's going on?"

"Nothing that need concern you," said Janacek. "Understand me, t'Larien, if you will. Perhaps, to you as to Arkin Ruark, I seem an evil man. You may think that of me. I care very little. I am not an evil man. That is why I admitted you, though I know full well that you have nothing to say to me. For *I* have things to say to you."

Dirk leaned against the back of the couch and nodded. "All right, Janacek. Go ahead."

"Your problem, t'Larien, is that you know little and understand less of Jaan and myself and our world."

"I know more than you think."

"Do you? You have read Jaan's writings on the *Demonsong*, and no doubt people have told you things. Yet what is that? You are no Kavalar. You do not understand Kavalars, I would guess, yet you stand here and I see judgment in your eyes. By what right? Who are you to judge us? You scarcely know us. I will give you an instance. Just a second ago, you called me Janacek."

"That's your name, isn't it?"

"That is part of my name, the last part, the least and smallest part of who I am. It is my chosen-name, the name of an ancient hero of the Ironjade Gathering who lived a long and fruitful life, many times honorably defending his holdfast and his *kethi* in highwar. I know why you use it, of course. On your world and in your naming system, it is customary to address those toward whom you feel distance or hostility by the final component of their names—an intimate you would call by his first name, would you not?"

Dirk nodded. "More or less. It's not quite that simple, but you're close enough."

Janacek smiled thinly; the blue eyes seemed to sparkle. "You see, I *do* understand your people, only too well. I give you the benefit of your own ways—I call you t'Larien, because I am hostile to you, and that is correct. You do not reciprocate, however. You address me as Janacek, without an instant of thought or concern, quite deliberately imposing your own naming system on me."

"What should I call you then? Garse?"

Janacek made a sharp, impatient gesture. "Garse is my true name, but it is not proper from you. In Kavalar custom, use of that name alone

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would indicate a relationship that does not in fact exist between us. Garse is a name for my *teyn* and my *cro-betheyn* and my *kethi,* not for an offworlder. Properly you should call me Garse Ironjade, and my *teyn* Jaantony high-Ironjade. Those are traditional and correct from an equal, a Kavalar of another house with whom I am on speaking terms. I give you the benefit of many doubts." He smiled. "Now understand, t'Larien, that I tell you this as illustration only. I care precious little whether you call me Garse or Garse Ironjade or Mister Janacek—call me whatever makes your heart happiest and I will take no insult. The Kimdissi Arkin Ruark has even been known to call me *Garsey,* yet I have resisted the urge to prick him and see if he pops. These matters of courtesy and address—I do not need Jaan to tell me that they are old things, legacies of days both more elaborate and more primitive, dying in this modern time. Today Kavalars sail ships from star to star, talk and trade with creatures we would once have exterminated as demons, even shape the very planets as we have shaped Worlorn. Old Kavalar, the language of the holdfasts for thousands of your standard years, is scarcely spoken any more, though a few terms linger on and will continue to linger, since they name realities that can be named only clumsily or not at all in the tongues of the star-travelers—realities that would soon vanish if we gave up their names, the Old Kavalar terms. Everything has changed, even we of High Kavalaan, and Jaan says that we must change still more if we are to fulfill our destiny in the histories of man. Thus the old rules of names and namebonds break down, and even highbonds grow lax in their speech, and Jaantony high-Ironjade goes about calling himself Jaan Vikary."

"If it doesn't matter," Dirk said, "then what's your point?"

"The point was illustration, t'Larien, of how much of your own culture you wrongly presume to be part of ours, of how you press your judgments and your values on us with every word and action. That was the point. There are more important matters in question, but the pattern is the same, you make the same mistake, a mistake you ought not make. The price might be greater than you can afford. Do you think I do not know what you are trying to do?"

"*What* am I trying to do?"

Janacek smiled again, his eyes small and hard, tiny wrinkles creasing the skin at their corners. "You try to take Gwen Delvano away from my *teyn.* Truth?"

Dirk said nothing.

"It is truth," Janacek said. "And it is wrong. Understand that it will never be permitted. *I* will not permit it. I am bonded by fire-and-iron to Jaantony high-Ironjade, and I do not forget that. We are *teyn*-and-*teyn,* we two. No bond that you have ever known is as strong."

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Dirk found himself thinking of Gwen; of a deep red teardrop full of memories and promises. He thought it a pity that he could not give the whisperjewel to Janacek to hold for a moment, so the arrogant Kavalar could taste just how strong a bond Dirk had had with his Jenny. But such a gesture would be useless—Janack's mind would have no resonances with the patterns esper-etched in the stone, it would be only a gem to him. "I loved Gwen," he said sharply. "I doubt that any bond of yours is more than that."

"Do you? Well, you are no Kavalar, no more than Gwen is, you do not understand the fire-and-iron. I first encountered Jaantony when each of us was quite young—I was even younger than he, in truth. He was fond of play with children younger than himself, rather than his agemates, and he came frequently to our crèche. I held him in great esteem from the first, as only a boy can, because he was older than me and thus closer to being a highbond, and because he led me on adventures into strange corridors and caves, and because he told fascinating stories. When I was older, I learned why he came among the younger children so often, and I was shocked and shamed—he was afraid of those as old as he, because they taunted him and often beat him. Yet by the time I learned that, a bond existed between us—you might call it friendship, but you would be wrong to do so, you would be imposing your own concepts on our lives once more—it was more than your offworlder friendship, there was iron between us already, although we were not yet *teyn*-and-*teyn*. The next time that Jaan and I went exploring together—we were far beyond our holdfast, in a cavern he knew well—I surprised him and beat him until every part of his flesh was bruised and swollen. He did not visit my age-barracks for the entire winter, yet at last he returned. We had no bitterness between us. We began to roam and hunt together once more, and he told me more stories, tales of myth and history. For my part, I would assault him randomly, always catching him unready and overwhelming him. In time he began to fight back, and well. In time it became impossible for me to surprise him with my fists. One day I smuggled a knife out from Ironjade beneath my shirt, and bared it on Jaan and cut him. Then we both began to carry knives. When he reached his adolescence, the age where he would pick his chosen-names and become subject to the code duello, Jaantony was no longer a subject of easy taunt. He was always unpopular—you must understand that he was ever a questioning sort, given to uncomfortable inquiries and unorthodox opinions, a lover of history but openly contemptuous of religion, with much too much unhealthy interest in the offworlders who moved among us. As such, he was challenged again and again that first year he attained dueling age. He

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always won. When I reached adolescence a few years later, and we became *teyn*-and-*teyn*, I had scarcely anyone to fight. Jaantony had put fear in all of them, so they would not challenge us. I was very disappointed.

"Since that time we have dueled together often. We are bonded for life, and we have been through much, and I do not care to hear you spout comparisons with this meaningless 'love' you offworlders are so enchanted by, this mockman bond that comes and goes with the whim of a moment. Jaantony himself was badly corrupted by the concept during his years on Avalon, and that was in some measure my responsibility because I let him go alone. It was true that on Avalon I would have had no function and no place, yet I should have been there. I failed Jaan in that. I will never fail him again. I am his *teyn* and always his *teyn*, and I will permit no one to kill him or wound him, or twist his mind, or steal his name. These things are my bond and my duty. Too often these days Jaan lets his very name be threatened by such as you and Ruark—he is in many ways a perverse and dangerous man, and the quirks of his mind often bring us into peril. Even his heroes—I remembered, one day, some of the stories he had told me in childhood, and was struck by the fact that all of Jaan's favorite heroes were solitary men who suffered ultimate defeat. Aryn high-Glowstone, as an instance, who dominated an entire epoch of history—he ruled by force of personality the most powerful holdfast High Kavalaan ever knew, the Glowstone Mountain, and when his enemies leagued against him in highwar, all hands raised against his, he put swords and shields on the arms of his *eyn-kethi* and took them to battle to swell the size of his army. His foes were broken and humiliated, and so Jaan would tell me the story. Yet later I learned that Aryn high-Glowstone won no victory at all. So many of his holdfast's *eyn-kethi* were slain that day that few remained to birth new warriors. Glowstone Mountain declined steadily in power and in population, and forty years after Aryn's bold stroke, the Glowstones fell and highbonds from Taal and Ironjade and Bronzefist took their women and children, leaving the halls abandoned. The truth of Aryn high-Glowstone is that he was a failure and a fool, and such are all Jaan's mad heroes."

"Aryn sounds heroic enough to me," Dirk said sharply. "On Avalon we'd probably credit him with freeing the slaves, even if he didn't win."

Janacek glowered at him, his eyes like blue sparks set in his narrow skull. He tugged at his red beard in annoyance. "T'Larien, that comment is precisely what I warned you of. *Eyn-kethi* are not slaves, they are *eyn-kethi*. You judge wrongly and your translations are false."

"According to you," Dirk said.

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"According to Ruark—"

"Ruark." Janacek's tone was contemptuous. "Is the Kimdissi the source of all your information about High Kavalaan? I see that I have wasted time and words on you, t'Larien. You are already poisoned and you have no interest in understanding. You are a tool of the manipulators of Kimdiss. I will lecture you no more."

"Fine," Dirk said. "Just tell me where Gwen is."

"I told you."

"When will she be back, then?"

"Late, and then she will be tired. I am certain that she will not wish to see you."

"You *are* keeping her from me!"

Janacek was silent for a moment. "Yes," he said finally, his mouth grim. "It is the best course, t'Larien, for you as well as her, although I do not expect you to believe that."

"You have no right."

"In your culture. I have every right in mine. You will not be alone with her again."

"Gwen is not part of your damned sick Kavalar culture," Dirk said.

"She was not born into it, yet she took the silver-and-jade, and the name *betheyn.* Now she is Kavalar."

Dirk was trembling, his control gone. "What does she say to that?" he demanded, stepping closer to Janacek. "What did she say last night? Did she threaten to leave?" He jabbed the Kavalar with his finger. "Did she say she was coming with me, was that it? And you hit her and carried her off?"

Janacek frowned and brushed Dirk's hand away forcefully. "So you spy on us too. You do it poorly, t'Larien, but it is offensive nonetheless. A second mistake. The first was Jaan's, in telling you the things he did, in trusting you and lending you his protection."

"I don't need anyone's protection!"

"So you say. An idiot's misplaced pride. Only those who are strong should reject the protections given the weak—those who are truly weak need them." He turned away. "I will waste no more time with you," he said, walking towards the dining chamber. There was a thin black carrying-case lying on the table. Janacek opened it, clicking back both locks simultaneously and flipping up the lid. Inside Dirk saw five rows of the black iron banshees, on red felt. Janacek held one up. "Are you quite certain that you do not want one of these? *Korariel?"* He grinned.

Dirk crossed his arms and did not dignify the question with an answer.

Janacek waited a moment for a reply. When none came, he slipped the banshee-pin back into its place and closed the case. "The jelly children are not so choosy as you are," he said. "Now I must take these to Jaan. Get out of here."

It was early afternoon. The Hub burned dimly in the center of the sky,

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with the scattered small lights of the four visible Trojan Suns arrayed unevenly around it. A strong wind was blowing from the east, building into a gale, it seemed. Dust swirled through the gray-and-scarlet alleys.

Dirk sat on one corner of the roof, his legs hanging out over the street, mulling his possibilities.

He had followed Garse Janacek up to the airlot and had seen him depart, carrying the case of banshees and flying his massive squared-off military relic in its olive green armor. The other two aircars, the gray manta-wing and the bright yellow teardrop, were gone as well. He was stranded here in Larteyn, with no idea of where Gwen was or what they were doing to her. He wondered what to do. Abruptly it came to him.

He got up and went to the tubes and then down to Ruark's quarters in the base of the tower. Between two black-barked, ceiling-high plants in earthenware pots, a wallscreen waited, just as he remembered seeing it. Dark and unlit, as it had been since Dirk arrived. But no doubt there was an information circuit. He studied the double row of buttons beneath the screen.

One was marked with a question mark. He tried it, and was rewarded. Suddenly the screen was full of small script, a hundred numbers for a hundred basic services, everything from medical aid to religious information to offplanet news.

He punched the sequence for VISITOR TRANSPORT. Figures flowed across the screen, and one by one Dirk's hopes withered. There were aircar rental facilities at the spacefield and at ten of the fourteen cities; all closed. The functional aircars had left Worlorn with the Festival crowds. Other cities had provided hovercraft and hydrofoil boats; no longer. At Musquel-by-the-Sea, visitors could sail upcoast and down in a genuine wind-powered ship from the Forgotten Colony. Service terminated. The intercity air-bus line was closed down, the nuclear-powered stratoliners of Tober and the helium dirigibles of Eshellin were all grounded and gone. The wallscreen showed him a map of the high-speed subways that had run from beneath the spacefield out to each of the cities, but the map was drawn all in red, and the legend below it explained that red meant "Depowered—No Longer Operational."

There was no transportation left on Worlorn except walking, it seemed. Plus whatever late visitors had brought with them.

Dirk scowled and killed the readout. He was about to turn off the screen when another thought hit him. He punched for LIBRARY and got a query sign and instructions. Then he coded in "jelly children" and "define." He waited.

It was a short wait and he hardly needed the vast bulk of information the library threw at him, the details of history and geography and philos-

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ophy. The critical information he took in quickly, the rest he disregarded. "Jelly children," it seemed, was a popular nickname for the followers of a pseudo-religious drug cult on the World of the Blackwine Ocean. They were so-called because they spent years at a time living in the cavernous inner dampness of kilometer-long gelatinous slugs that crept with infinite slowness along the bottom of their seas. The Mothers, as the cultists called the creatures, fed their children with sweet hallucinogenic secretions and were believed to be semi-sentient. The belief, Dirk noted, did not stop the jelly children from killing their host when the quality of its dream secretions began to decline, which invariably happened as the slugs aged. Free of one Mother, the jelly children would then seek another.

Quickly Dirk cleared the screen of that data, and consulted the library again. The World of the Blackwine Ocean had a city on Worlorn. It lay beneath an artificial lake fifty kilometers around, under the same dark, teeming waters that covered the surface of the Blackwiners' homeworld. It was called the City in the Starless Pool, and the surrounding lake was full of life forms brought in for the Festival of the Fringe. Including Mothers, no doubt.

Out of curiosity, Dirk found the city on a map of Worlorn. He had no way of getting there, of course. He killed the wallscreen and walked into the kitchen to mix himself a drink. As he threw it down, he remembered Kryne Lamiya. In a windswept landing deck, two aircars sat abandoned. Dirk put his glass down thoughtfully, wiped his lip with the back of his hand, and went back to the wallscreen.

It was a simple matter to find the location of all aircar landing facilities in Larteyn. There were lots atop all of the larger residential towers, and a big public garage deep within the rock beneath the city. The garage, the city directory informed him, could be reached from any of twelve undertubes spaced evenly through Larteyn; its concealed doors opened in the middle of the plunging cliff that loomed above the Common. If the Kavalars had left any aircars at all in the shell of their city, that was where he would find them.

He took the tubes down to ground level and the street. The glowstone streets were faded and black where the red gloom fell, but when Dirk walked through the shadows between the square-ebon towers he could still see the cold fires of the city beneath his feet, the soft red glow of the rock, fading yet still persisting. He saw no one else during his walk, although he wondered uneasily about the Braiths, and once he passed what must have been a dwelling. It was a square building with a domed roof and black iron pillars at its door, and chained to one of those pillars was a hound that stood taller than Dirk, with bright red eyes and a long hairless face that reminded him some-

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how of a rat. The creature was worrying a bone, but it stood when he walked past, and growled deep in its throat. Whoever lived in that building clearly did not relish the idea of visitors.

The undertubes still functioned. He fell and daylight vanished, and he got out again in the lower passages, where Larteyn had the greatest resemblance to the holdfasts of High Kavalaan itself; echoing stone halls with wrought iron hangings, metal doors everywhere, chambers within chambers. A fastness in stone, Ruark had said once. A fortress, no part of which could be taken easily. But now abandoned.

The garage was multi-leveled and dimly-lit, with space enough for a thousand aircars on each of its ten levels. Dirk wandered through the dust for a half-hour before he found even one. It was useless to him; another beast-car, fashioned of blue-black metal in the grotesque likeness of a giant bat, it was more realistic and frightening than Jaan Vikary's rather stylized manta-banshee. But it was also a burned-out hulk. One of the ornamental batwings was twisted and half-melted, and of the aircar itself only the body remained. The interior appointments, the power plant, and the weaponry were all gone. He walked around it once and passed on.

The second aircar he found was in even worse shape. In fact, it could hardly be called a car at all. Nothing remained but a bare metal frame and four rotting seats squatting in the midst of the tubing; a skeleton gutted of even its skin. Dirk passed by that one, too.

The next two wrecks he came to were both intact, but ghosts. He tried both of them, and neither responded to his touch and his tinkerings.

The fifth car—by then a full hour had passed—responded much too quickly.

Thoroughly Kavalar, the car was a stubby two-seater with short, triangular wings that looked even more useless than the wings on other aircars of High Kavalaan manufacture. It was all silver and white enamel, and the metal canopy was shaped to resemble a wolf's head. Lasercannon were mounted on both sides of the fuselage. The car was not locked; Dirk pushed up on the canopy and it swung open easily. He climbed in, snapped it shut and looked out of the wolf's great eyes with a wry smile on his face. Then he tried the controls. The carrier still had full power.

Frowning, he killed that power again, and sat back to think. He could not fool himself; this car was not a derelict, like the others. No doubt it belonged to one of the other Kavalars still in Larteyn. It probably belonged to Lorimaar or one of the other Braiths. Taking it was not the safest course he could choose, not by a long margin.

Dirk recognized the danger, and considered it. Jaan Vikary or no Jaan Vikary, stealing an aircar might just

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provoke the Braiths into action.

Reluctantly, he swung back the canopy and climbed out, but no sooner had he emerged than he heard voices. He eased the aircar canopy down and it closed with a faint but audible click. Dirk crouched and made for the safety of the shadows a few meters beyond the wolf-car.

He could hear the Kavalars talking, and their footsteps noisily echoing, long before he saw them; there were only two, but they sounded like ten. By the time they had moved into the light near the aircar, Dirk was pressed flat against a niche in the garage wall, a small cavity full of hooks where tools had once been hung. He was not quite sure why he was hiding, but he was very glad of it.

"Are you sure of all this, Bretan?" one of them, the taller, was saying as they came into sight. He was not Lorimaar, but the semblance was striking; this man had the same imposing height, the same tan and wrinkled face. But he ran more to fat than Lorimaar high-Braith, and his hair was pure white where the other's had been mostly gray, and he had a small toothbrush of a mustache. Both he and his companion wore short white jackets over pants and shirt of chameleon cloth that had darkened to near-black in the dimness of the garage. And they both had lasers.

"Roseph would not jape me," the second Kavalar said in a voice that rasped like sandpaper. He was much shorter than the other man, close to Dirk's own height, and younger as well, very lean. His jacket had the sleeves cut off to display powerful brown arms and a thick iron-and-glowstone armlet. He came full into the light for an instant and seemed to stare at the darkness where Dirk was hidden. He had only half a face; the rest was all twitching scar-tissue. His left "eye" moved restlessly as his face turned, and Dirk saw the telltale fire; a glowstone set in an empty socket.

"How do you know?" the older man said. "Roseph is fond of japes."

"I am *not* fond of japes," said the other, the one who had been called Bretan. "Roseph might jape you, or Lorimaar, or even Pyr, but he dare not jape me." His voice was horribly unpleasant; there was a grating rawness to it that offended the ear, but with the scars as thick as they were up and down his neck, Dirk found it surprising that the man could talk at all.

The taller Kavalar pushed up against the side of the wolf's head, but the canopy did not lift. "Well, if this is truth then, we must hurry," he said querulously. "The lock, Bretan, the lock."

One-eyed Bretan made an odd noise partway between a grunt and a growl. He tried the canopy himself. "My *teyn*," he rasped. "I left the

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head slightly ajar . . . I . . . it only took a moment to come up and find you."

In the shadows, Dirk pressed back hard against the wall, and the hooks dug painfully into his back between the shoulder blades. Bretan frowned and knelt, while his older companion stood and looked puzzled.

Then suddenly the Braith was standing again, and his laser pistol was snug in his right hand, trained on Dirk. His glowstone eye smouldered faintly. "Come out and let us discover what you are," he announced. "The trail you left in the dust is very plain to see."

Dirk, silent, raised his hands above his head and emerged.

"A mockman!" the taller Kavalar said. "Down here!"

"No," Dirk said carefully. "Dirk t'Larien."

The tall one ignored him. "This is rare good fortune," he said to his companion with the laser. "Those jellymen of Roseph's would have been poor prey at best. This one looks fit."

His young *teyn* made the odd noise again, and the left side of his face twitched. But his laser hand was quite steady. "No," he told the other Braith. "Sadly, I do not think he is ours to hunt. This can only be the one that Lorimaar spoke of." He slid his laser pistol back into his holster and nodded at Dirk, a very slight and deliberate motion, more a shifting of his shoulders than of his head. "You are grossly careless. The canopy locks automatically when full-closed. It may be opened from inside, but . . ."

"I realize that now," Dirk said. He lowered his hands. "I was only looking for an abandoned car. I needed transportation."

"So you sought to steal our aircar."

"No."

"Yes." The Kavalar's voice made every word a painful effort, "You are *korariel* of Ironjade?"

Dirk hesitated, his denial caught in his throat.

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"You have no answer to that?" said the scarred one.

"Bretan," the other cautioned. "The mockman's words are no matter to us. If Jaantony high-Ironjade names him *korariel*, then such is truth. Such animals have no voice about their status. Whatever he might say cannot lift the name, so the reality is the same in any event. If we slay him, we have stolen Ironjade property and they will surely issue challenge."

"I urge you to consider the possibilities, Chell," Bretan said. "This one, this Dirk t'Larien, he can be man or mockman, *korariel* of Ironjade or not, truth?"

"Truth. But he is no true man. Listen to me, *teyn*. You are young, but I know of these things from *kethi* long dead."

"Consider nonetheless. If he is mockman and the Ironjades name him *korariel*, then he is *korariel* whether he admits it or no. But if that is truth, Chell, then you and I must go against the Ironjades in duel. He was trying to steal from us, remember. If he is Ironjade property, then that is an Ironjade theft."

The big white-haired man nodded slowly, reluctantly.

"If he is mockman but not *korariel* then we have no problem," Bretan continued, "since then he may be hunted. And what if he is a true man, human as a highbond, and no mockman at all?"

The older Kavalar frowned thoughtfully and said, "Well, he is no female, so he cannot be owned. But if he is human, he must have a man's rights and a man's name."

"Truth," Bretan agreed. "But he cannot be *korariel*, so his crime would be his alone. I would duel him, not Jaantony high-Ironjade." The Braith gave his strange grunt-growl again.

Chell was nodding, and Dirk was almost numb.

"Where shall we take him?" Chell said. The two Braiths spoke as if Dirk had no more volition than their aircar.

"We must take him to Jaantony high-Ironjade and his *teyn*," Bretan said in his sandpaper growl. "I know his tower by sight."

Briefly, Dirk considered running. It did not seem feasible. There were two of them, with sidearms and even an aircar. He would not get far. "I'll come," he said when they started toward him. "I can show you the way." It seemed that he would be given some time to think, in any event; the Braiths did not seem to know that Vikary and Janacek were already out at the City in the Starless Pool, no doubt trying to protect the hapless jelly children from the other hunters.

"Show us, then," Chell said. And Dirk, not knowing what else to do, led them toward the undertube.

CHAPTER SIX

At first, the waiting was sheer hell.

They took him to the airlot on top of the empty tower after they discov-

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ered that the Ironjades were not to be found, and they forced him to sit in a corner of the windswept roof. The panic was rising in him by then, and his stomach was a bleeding knot. "Bretan," he began, in a voice laced by hysteria, but the Kavalar only turned on him and delivered a stinging open-handed blow across the mouth.

"I am not 'Bretan' to you," he said. "Call me Bretan Braith if you must address me, mockman."

After that, Dirk was silent. The broken Wheel of Fire limped oh-so-slowly across the sky of Worlorn, and as he watched it crawl, it seemed to Dirk that he was very close to a breaking point. Everything that had happened to him seemed unreal, and the Braiths and the events of the afternoon were the least real of all, and he wondered what would happen if he were to suddenly leap to his feet and vault over the edge of the roof into the street. He would fall and fall, he thought, as one does in a dream, but when he smashed on the dark glowstone blocks below there would be no pain, only the shock of a sudden awakening. And he would find himself in his bed on Braque, drenched with sweat and laughing at the absurdities of his nightmare.

He played with that thought and others like it for a time that seemed like hours, but when he looked up at last, Fat Satan had hardly sunk at all. He began to tremble then; the cold, he told himself, the cold Worlorn wind, but he knew that it was not the cold, and the more that he fought to control it the more he shook, until the Kavalars looked at him strangely. And still the waiting went on.

And finally the shakes ran their course, as had the thoughts of suicide and the panic before them, and an odd sort of calm swept over him. He found himself thinking again, but thinking of nonsensical things; speculating idly—as if he were soon going to place a wager—on whether the gray manta or the military flyer would return first, on how Jaan or Garse would fare in a duel with one-eyed Bretan, on what had happened to the jelly children in the distant Blackwiner city.

Then he began to watch his captors. That was the most interesting game of all, and it served to pass the time as well as any other. As he watched, he noticed things.

The two Kavalars had hardly spoken since they escorted him up to the rooftop. Chell, the tall one, sat on the low wall that surrounded the airlot only a meter away from Dirk, and when Dirk began to study him, he saw that he was quite an old man indeed. The resemblance to Lorimaar high-Braith was very deceptive. Although Chell walked and dressed like a younger man, he was at least twenty years senior to Lorimaar, Dirk guessed. Seated, his years weighed on him heavily. A distinct paunch bulged over the soft-shining metal of his mesh-steel belt, and his wrinkles were carved very deep into his worn brown face, and Dirk saw

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blue veins and splotches of grayish-pink skin on the back of Chell's hands as they rested on his knees. His cheeks seemed to sag, and his wide shoulders had unconsciously fallen into a tired slouch. He moved once, sighing, and his hands came off his knees and twined together, and he stretched. That was when Dirk saw his armlets. The right arm was iron-and-glowstone, twin to the one displayed so proudly by one-eyed Bretan, and the left was silver. But the jade was missing. It had been there once, but the stones had been torn from their settings, and now the silver bracelet was riddled by holes.

While old Chell sat and waited for something to happen, Bretan paced the hours away. He was all restless energy, worse than anyone that Dirk had ever known, even Jenny, who had been quite a pacer in her time. He kept his hands deep in the slit pockets of his short white jacket and walked back and forth across the rooftop, back and forth, back and forth. Every third trip or so he would glance up impatiently, as if he were reproaching the twilight sky because it had not yet yielded up Jaan Vikary.

They were a strange pair, Dirk decided as he watched them. Bretan Braith was as young as Chell was old, surely no older than Garse Janacek and probably younger than Gwen or Jaan or himself. How had he come to be *teyn* to a Kavalar so many years his senior? He was no high, either, he had given no *betheyn* to Braith; his left arm, covered by fine reddish hairs that glinted now and then when he walked very close and let them catch the sunlight, had no bracelet of silver-and-jade.

His face, his strange half-face, was ugly beyond anything that Dirk had ever seen, but as the day waned and false dusk became real, he found himself getting used to it. When Bretan Braith paced in one direction, he looked utterly normal; a whip-lean youth, full of nervous energy held tightly in check, so tightly that Bretan almost seemed to *crackle*. His face, on that side, was unlined and serene; short black curls pressed tightly around his ear and a few ringlets dropped to his shoulders, but he had no hint of a beard. Even his eyebrow was only a faint line above a wide green eye. He appeared almost innocent.

Then, pacing, he would reach the edge of the roof and turn back the way he had come, and everything would be changed. The left side of his face was inhuman, a landscape of twisted plains and angles that no face ought to have. The flesh was seamed in a half-dozen places, and elsewhere it was shiny-slick as enamel. On this side, Bretan had no hair whatsoever, and no ear—only a hole—and the left half of his nose was a small piece of flesh-colored plastic. His mouth was a lipless slash, and worst of all, it moved. He had a twitch, a grotesque tic, and it touched the left corner of his mouth at intervals and rippled up his scalp over hills of scar tissue.

In the daylight, the Braith's glow-

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stone eye was as dark as a piece of obsidian. But slowly night was coming, the Helleye sank, and the fires were stirring in his socket. At full darkness, Bretan would be the helleye, not Worlorn's tired supergiant of a sun; the glowstone would burn a steady, unwinking red, and the half-face around it would become a black travesty of a skull, a fit home for an eye such as that.

It all seemed very terrifying, until you remembered—as Dirk remembered—that it was all quite deliberate. Bretan Braith had not been forced to have a glowstone for an eye; he had chosen it, for his own reasons, and those reasons were not hard to comprehend.

Dirk almost felt sorry for them. They were misfits, he decided, more outcast and more alone than Dirk himself, worldless in a sense, because High Kavalaan had moved beyond them and could be *their* world no longer. No wonder they came to Worlorn; they belonged here. They and all their ways were dying.

Bretan in particular was a figure of pity, Bretan who tried so hard to be a figure of fear. He was young, perhaps the last true believer, and he might live to see a time when no one felt as he did. Was that why he was *teyn* to Chell? Because his peers rejected him and his old man's values? Probably, Dirk decided, and that was grim and sad.

One yellow sun still glinted in the west, and the Hub was a vague red memory on the horizon, and Dirk was thoughtful and in control, beyond all fear, when they heard the aircars approach.

Bretan Braith froze and looked up, and his hands came out of his pockets. One of them came to rest, almost automatically, on the holster of his laser pistol. Chell, blinking, got slowly to his feet and suddenly seemed to shed a decade. Dirk rose as well.

The cars came in. Two of them together, the gray car and the olive green one, flying with an almost military precision side-by-side.

"Come here," Bretan rasped, and Dirk walked over to him, and Chell joined them so that the three were standing together with Dirk in the center, like a prisoner. The wind bit at him. All around the glowstones of the city Larteyn were radiant and bloody and Bretan's eye—so close—shone savagely in its scarred nesting place. The twitching had stopped, for some reason; his face was very still.

Jaan Vikary hovered the gray manta and let it float gently down, then vaulted over the side and came to them with quick strides. The square and ugly military machine, roofed over and armored so the pilot was not visible, landed almost simultaneously. A thick metal door swung open in its side and Garse Janacek emerged, ducking his head a trifle and looking around to see what was the problem. He saw, straightened and slammed the door with a resounding *clang*, then came over to stand at Vikary's right arm.

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Vikary greeted Dirk first, with a curt nod and a vague smile. Then he looked at Chell. "Chell Nim Cold-wind fre-Braith Daveson," he said formally. "Honor to your holdfast, honor to your *teyn*."

"And to yours," the old Braith said. "My new *teyn* guards my side, and you know him not." He indicated Bretan.

Jaan turned, weighed the scarred youth quickly with his eyes. "I am Jaan Vikary," he said, "of the Ironjade Gathering."

Bretan made his peculiar noise.

"More properly," Janacek said, "my *teyn* is Jaantony Riv Wolf high-Ironjade Vikary. And I am Garse Ironjade Janacek."

"Honor to your holdfast, honor to your *teyn*. I am Bretan Braith Lantry."

"I would never have known," Janacek said with the barest trace of a smile. "We have heard of you."

Jaan Vikary threw him a warning glance. There seemed to be something wrong with Jaan's face. At first Dirk thought it was a trick of the light—darkness was coming fast now—but then he saw that Vikary's jaw was slightly swollen on one side, giving his profile a puffed look.

"We come to you in high grievance," said Bretan Braith Lantry.

Vikary looked at Chell. "This is so?"

"It is so, Jaantony high-Ironjade."

"I am sorry we must quarrel," Vikary replied.

"We must question you," Bretan said. He put his hand on Dirk's shoulder. "This one, Jaantony high-Ironjade. Tell us, is he *korariel* of Ironjade, or no?"

Now Garse Janacek grinned openly and his hard blue eyes met Dirk's, laughing just a little in their icy depths, as if to say *well, well, what have you done now?*

Jaan Vikary only frowned. "Why?"

"Does your truth depend on our reasons, highbond?" Bretan asked harshly. His scarred cheek twitched violently.

Vikary looked at Dirk. Clearly he was not pleased.

"You have no cause to delay or deny us your answer, Jaantony high-Ironjade," Chell said. "The truth is yes or the truth is no, there cannot be more to it than that."

"Once you were correct, Chell fre-Braith," Vikary began. "In the old days of the holdfasts, truth was a simple matter, but these are new times and full of new things. We are a people of many worlds now, not simply of one, and so our truths are more complex."

"No," said Chell. "This mockman is *korariel*, this mockman is not *korariel*. That is not complex."

"My *teyn* Chell speaks the truth," Bretan added. "The question I have put to you is quite simple, highbond. I demand your answer."

Vikary would not be pushed. "Dirk t'Larien is a man from the distant world of Avalon, far within

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the Tempter's Veil, a human world where I once studied. I did name him *korariel*, to give him my protection and the protection of Ironjade against those who would do him harm. But I protect him as a friend, as I would protect a brother in Ironjade, as a *teyn* protects a *teyn*. He is not my property. I make no claim to own him. Do you understand."

Chell did not. The old man pressed his lips together beneath his little stiff mustache and mumbled something in old Kavalar. Then he spoke aloud. Too loud, in fact, almost shouting. "What is this nonsense? You talk mockman talk, highbond. Friend is a mockman word. Your *teyn* is Garse Janacek, not this strange one, how can you shield him as a *teyn*? Is he of Ironjade? He is not even armed! Is he a man at all? Why, if he is, he cannot be *korariel* and if he is not and he is *korariel* then you must own him. I do not hear any sense in your mockman words."

"I am sorry of that, Chell fre-Braith," Vikary said, "but it is your ears that fail, and not my words. I try to do you honor, but you do not make it easy."

"You jape me!" Chell said, accusingly.

"No."

"You do!"

Bretan Braith spoke then, and his voice had none of Chell's anger, but it was hard. "Dirk t'Larien, as he calls himself and you call him, has done us wrong. This is the heart of the matter, Jaantony high-Ironjade. He has laid hands upon the property of Braith without any word of Braith permission. Now, who pays for this? If he is a mockman and *korariel* to you, then here and now I issue challenge. Ironjade has done wrong to Braith. If he is not *korariel*, then, well . . ." He stopped.

"I see," Jaan Vikary said. "Dirk?"

"For one thing, all I did was sit in the aircar for a second," Dirk said, uneasily. "I was looking for a derelict in working order."

Vikary shrugged and looked at the two Braiths. "It seems that small wrong has been done, if any. Nothing was taken."

"Our car was *touched*!" old Chell bellowed. "By him, by a mockman, he had no right! Small wrong, you call this? He might have flown it off. Would you have me close my eyes like a mockman and be thankful he did so little?" He turned to Bretan, his *teyn*. "The Ironjades jape us, insult us," he said. "Perhaps they are not true men, but mockmen themselves. They are full of mockman words."

Garse Janacek responded immediately. "I am *teyn* to Jaantony Riv Wolf high-Ironjade, and I vouch for him. He is no mockman."

From the way that Janacek then looked towards Vikary, it seemed clear to Dirk that he expected his *teyn* to repeat the same words. Instead Jaan shook his head and said, "Ah, Chell. There are no mockmen." He sounded tired.

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The elderly Braith looked as though Jaan had struck him. Again he muttered low, hoarse words in Old Kavalar.

"This can not go on," Bretan Braith said. "We get nowhere. Did you name this man *korariel*, Jaan-tony high-Ironjade?"

"I did."

"I rejected the name," Dirk said quietly. Bretan half-turned and glared at him, and the Braith's green eye seemed to have as much fire in it as its glowstone counterpart.

"He rejected only the suggestion of property," Vikary said very quickly. "My friend asserted his humanity, but he still wears the shield of my protection."

Garse Janacek grinned and shook his head. "No, Jaan. T'Larien wants none of our protection, either. He said so."

Vikary looked at him, furious. "Garse! This is no time for jokes."

"I do not joke," said Janacek.

"It's true," Dirk admitted.

"Dirk, you do not know what you are saying!" Vikary said.

"For a change, I think I do."

Bretan Braith Lantry made his noise, quite loudly and suddenly, while Dirk and the two Ironjades argued and his *teyn* Chell stood stiff with fury. "Silence," the sandpaper voice demanded, and it got it. "This is of no consequence. Things are the same. You say he is human, Ironjade. If so, he cannot be *korariel* and you cannot protect him. If he wants it or no, you cannot protect him. My *kethi* will see that you do not." He spun on his heel to face Dirk full-front. "I challenge you, Dirk t'Larien."

Everyone was quiet. "I meant no insult," Dirk said, remembering words that the Ironjades had used at other times. "Am I allowed to apologize, or what?" He offered his palms to Bretan Braith, up and open and empty.

The scarred face twitched. "Insult was taken."

"You must duel him," Janacek said.

Dirk's palms sank slowly. At his side, they became fists. He said nothing.

Jaan Vikary was staring at the ground mournfully, but Janacek was still animated. "Dirk t'Larien knows nothing of the dueling customs," he told the two Braiths. "Such customs do not prevail on Avalon. Will you allow me to instruct him?"

Bretan Braith nodded, the same curiously awkward motion of head and shoulders that Dirk had noticed that afternoon in the garage.

"There are four choices to make, t'Larien," Janacek said to Dirk. "As challenged, you make the first. I urge you to make the choice of weapons, and to choose blades."

"Blades," Dirk said softly.

"I make the choice of mode," Bretan rasped, "and I choose the death-square."

Janacek nodded. "You have the third choice also, t'Larien. Since you have no *teyn*, the choice of numbers

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is dictated. It must be singles. You may say that, or you may choose the place."

"Old Earth?" Dirk said hopefully.

Janacek grinned. "No. This world only, I fear. Other choices are not legal."

Dirk shrugged. "Here, then."

"I make the choice of numbers," Bretan said. It was dark now, with only the scattering of outworld stars to light the sky above. The Braith's eye flamed, and reflected light glistened on his scars. "I choose singles, as it must be."

"It is set then," Janacek said. "You two must agree on an arbiter, and then . . ."

Jaan Vikary looked up. His features were shadowy, with only the light of the glowstones to shine on them, but his swollen jaw cast an odd silhouette. "Chell," he said very quietly, in a deliberate tone.

"Yes," the old Braith replied.

"You are a fool to believe in mockmen," Vikary told him. "All of you who believe such are fools."

Dirk was still facing Bretan Braith when Vikary spoke. The scarred face twitched once, twice, a third time.

Chell sounded as if he were in a trance. "Insult is taken, Jaantony high-Ironjade, false Kavalar, mockman. I issue challenge."

Bretan whirled and tried to shout. His voice was not capable of it, and he sputtered and choked instead. "You . . . duel breaker!"

"It is within the code," Vikary replied half-heartedly. "Though perhaps, if Bretan Braith could overlook the small trespass of an ignorant offworlder, then I might find it in myself to beg forgiveness from Chell fre-Braith."

"No," Janacek said darkly. "Begging has no honor."

"No," Bretan echoed. His face *was* a skull now. "I have bent as far as I may bend for you, false Kavalar. I will not make jape of all the wisdom of my holdfast. My *teyn* was more right than I. In truth, I was bitter wrong to even try to avoid duel with you, liar. Mockman. There was great shame in it. But now I will be clean. We will kill you, Chell and I. We will kill all three of you."

"Perhaps that is truth," Vikary said. "It will soon be done, and then we will see."

"And your *betheyn*-bitch too," Bretan said. He could not shout; his voice broke when he tried. So he spoke as low as ever, and the rawness caught in his throat, and he could not be held. "When we have done with you, we will wake our hounds and hunt her and her fat Kimdissi through the forests they know so well."

Jaan Vikary ignored him. "I am challenged," he said to Chell fre-Braith. "The first of the four choices is mine. I make the choice of numbers. We will fight *teyn*ed."

"I make the choice of weapons," Chell replied. "I choose sidearms."

"I make the choice of mode," said Vikary. "I choose the death-square."

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"Last the choice of place," Chell said. "Here, then."

"The arbiter will chalk only one square," Janacek said. Of the five men on the roof, only he was still smiling. "We need a arbiter still. The same for both duels?"

"One man will do," Chell said. "A man of stature and wisdom. Roseph Lant Banshee high-Braith Kelcek."

Janacek shrugged. "Agreed."

"I will ask him," said Chell. The others nodded.

"Tomorrow, then," said Janacek.

"All is done," Chell said.

And while Dirk stood and watched, feeling lost and out of place, the four Kavalars took their farewell. And strangely, strangely, before parting, each of them kissed his two enemies lightly on their lips.

And Bretan Braith Lantry, scarred and one-eyed, his lip half gone—Bretan Braith Lantry kissed Dirk.

When the Braiths had gone, the others went downstairs. Vikary opened the door to his apartment and turned on the lights. Then, in methodical silence, he began to build a fire in the great hearth beneath the mantle. Dirk felt the sudden heat on his face and hands. A scent like cinnamon filled the room. Vikary stood up and left.

He came back with three glasses, brandy snifters as black as obsidian. A bottle was under his arm. He handed one glass to Dirk and one to Garse, put the third down on a nearby table, and yanked the cork with his teeth. The wine within was a deep red in color, very pungent. Vikary poured all three glasses very full, and Dirk passed his under his nose. The vapors burned, but he found them oddly pleasant.

"Now," Vikary said, before any of them had tasted the wine. He set down the bottle and lifted his own glass. "Now, I am going to ask something very difficult of both of you. I am going to ask each of you to go beyond his own little culture for a time, and be something he has not been before, something strange to him. Garse, I ask you—for the good of each of us—to be friend to Dirk t'Larien. There is no word for it in Old Kavalar, I know. There is no need of such on High Kavalaan, where a man has his holdfast and his *kethi* and most of all his *teyn*. But we are all on Worlorn, and tomorrow we duel. Perhaps we do not duel all together, yet we have common enemies. So I ask you, as my *teyn*, to take the name and namebonds of friend with t'Larien."

"You ask a good deal of me," Janacek replied, holding his wine in front of his face and watching the flames dance in the black glass.

"I do," Vikary said.

Janacek looked at Dirk, then tasted his wine. "You are my *teyn*," he said. "I yield to your wishes. What obligations must I fulfill in the namebond of friend?"

"Treat a friend as you would a *keth*," Vikary said. He turned slightly

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to face Dirk. "And you, t'Larien, I ask something of you also. To be holdfast-brother, for a time, to Garse Ironjade Janacek."

Dirk never got the chance to respond; Janacek beat him to it. "You cannot do that. Who is he, this t'Larien? How can you think him worthy, bring him into Ironjade? He will be false, Jaan. He will not keep the bonds, will not defend the holdfast, will not return with us to the Gathering. I protest this."

"If he accepts, I think he will keep the bonds for a time," Vikary said.

"For a time? *Kethi* are linked forever!"

"Then this will be a new thing, a new sort of *keth*, a friend for a time."

"It is more than new," said Janacek. "I will not allow it."

"Garse," said Jaan Vikary. "Dirk t'Larien is now your friend, or have you forgotten so soon? You do wrong to try to block my offer. You break the bonds that you have just taken. You would not act such to *keth*."

"You would not be inviting a *keth* to be a *keth*," Janacek grumbled. "This is wrong, clearly."

"The highbond council is seated on High Kavalaan, and this is Worlorn," Vikary said. "Only you are here to speak for Ironjade. Will you hurt your friend?"

Vikary turned again to Dirk. "Well, t'Larien?"

"I don't know," Dirk said. "I think I know what it would mean, to be a holdfast-brother, and I suppose that I appreciate the honor, or whatever. But we have a lot of things between us, Jaan."

"You are speaking of Gwen," Vikary said. "She is indeed between us. But Dirk, I am asking you to be a new and special sort of holdfast-brother. Only for so long as you are on Worlorn, and only to Garse, not to myself or any other Ironjade. Do you understand?"

"I'm talking about last night," Dirk said. "I was at the door. I heard. Janacek hit her, and since then the two of you have had her locked up away from me."

Vikary smiled. "He hit her?"

Dirk nodded. "I heard it."

"You heard an argument and a blow, of that I have no doubt," Vikary said. He touched his swollen jaw. "How do you think *this* happened?"

Dirk stared. "I . . . I thought . . . I don't know, the jelly children or maybe . . ."

"Garse hit *me*, not Gwen," Vikary said.

"I would do it again," Janacek added in a surly voice.

"But," said Dirk, "but then, what was going on? Last night? This morning?"

Janacek rose and walked to Dirk's end of the couch to loom over him. "Friend Dirk," he said in slightly venomous tones, "this morning I told you the truth. Gwen went out with Arkin Ruark, to work. The Kimdissi had been calling for her all throughout yesterday. He was most frantic.

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The tale he told to me was that a column of armor-bugs had begun to migrate, undoubtedly in response to the growing cold. This is said to be very rare even on Eshellin. On Worlorn, of course, such an event is unique and cannot be recreated, and Ruark felt that it had to be studied at once. *Now* do you comprehend, my *friend* Dirk t'Larien, *now*?"

"Uh," said Dirk. "She would have said something."

Janacek returned to his seat with his gaunt hatchet face screwed up in a scowl. "My friend calls me a liar," he said.

"Garse speaks the truth," Vikary said. "Gwen said she would leave word for you, a note or a tape. Perhaps, in the excitement of her preparation, she forgot. Such things happen. She is very involved in her work, Dirk. She is a good ecologist."

Dirk looked at Garse Janacek. "Hold on," he said. "This morning, you *said* you were keeping her from me. You admitted it."

Vikary looked puzzled also. "Garse?"

"Truth," Janacek said grudingly. "He came up and pressed and pressed, forced his way inside with a transparent lie. More, he clearly wanted to believe that Gwen was being held captive by the foul Iron-jades. I doubt that he would have believed anything else." He sipped carefully at his wine.

"*That,*" Jaan Vikary said, "was not wise, Garse."

"Untruth given, untruth returned," Janacek said, looking smug.

"You are not being a good friend."

"I will henceforth be better," said Janacek.

"That pleases me," Vikary said. "Now, t'Larien, will you be *keth* to Garse?"

Dirk considered it for a long moment. "I guess," he finally said.

"Drink then," Vikary said. The three men raised their glasses in unison—Janacek's was already half-drained—and the wine flowed hot and a little bitter over Dirk's tongue. It was not the best wine he had ever tasted. But it was good enough.

Janacek finished his glass and stood. "We must talk of the duels." He looked at Dirk. "As first challenged, you must duel first, so you cannot hope that Jaan and I will slay them before they get to you. Bretan Braith Lantry is as widely known for his skill in duel as he is for his striking good looks. I suppose he is here hunting mockmen with Chell, but he is not really much of a hunter—he is more comfortable in the death-square than in the wild from all that I have heard of him. Even his own *kethi* find him difficult. In addition to being ugly, he took Chell fre-Braith to *teyn.* Chell was once a highbond of great power and honor but today he is a superstitious dodderer with a small mind and great wealth. The holdfast rumors say the wealth is the reason Bretan Braith wears Chell's fire-and-iron.

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No one tells this to Bretan openly, of course. He is said to be quite touchy. And now Jaan has made him angry as well, and perhaps he is a bit frightened. He will have no mercy for you. I hope that you can manage to cut him a bit before you die. That would make it easier for us in the duel to follow."

"Is he right?" Dirk asked Vikary.

"Garse exaggerates," Vikary said, "yet you *are* in danger. No doubt Bretan will try to kill you, if you let him. This need not happen. The rules of your mode and weaponry are quite simple. The arbiter will chalk a square upon the street, five meters by five, and you and your enemy will start from opposite corners. At a word from the arbiter, each of you will advance with your sword toward the center. When you meet, you fight. To satisfy the requirements of honor, you must take one blow and deal one. I would advise you to cut at his foot or at his leg, since this will indicate that you have no wish for a true death-duel. Then, after you have taken his first blow—try to deflect it with your sword, if you can—you can walk to the perimeter of the square. Do not run. There is no honor in running, and the arbiter will rule the duel a death-victory for Bretan, and then the Braiths will kill you. You must walk, calmly. At the perimeter line, once beyond it, you are safe."

"To achieve this safety you must *reach* the perimeter line," Janacek said. "Bretan will kill you first."

"If I deal my one blow, and take one, then can I drop my sword and walk away?" Dirk asked.

"In such a case, Bretan will kill you with a puzzled look on his face, or what remains of it," said Janacek.

"I would not do that," Vikary cautioned.

"Jaan's suggestions are folly," Janacek said. He walked slowly back to the couch, retrieved his glass, and poured himself more wine. "You should keep your sword, and fight him. Consider, the man is blind on one side. Surely he is vulnerable there! And see how awkwardly he nods or turns his head . . ."

Dirk's glass was empty. He held it out and Janacek filled it with wine. "How will *you* duel them?" Dirk asked.

"The rules for our mode and weaponry differ from yours," Vikary said. "The four of us must stand at the four corners of the death-square, with dueling lasers or other sidearms. We may not move except to step backwards, outside the square, to safety. And that we may not do until each man within the square has taken one shot. That done, the choice is ours. Those who remain within, if they still stand, may continue to fire. It can be a harmless mode, or a very deadly one, depending on the will of those participating."

"Tomorrow," Janacek promised, "it must be deadly." He drank again.

"I would wish otherwise," Vikary

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said with a rueful shake of his head, "but I fear you speak the truth. The Braiths are too full of anger for us to fire into the air."

"Indeed," Janacek said, with a small smile. "They took the insult too deeply. Chell Empty-Arms, at least, will not forgive."

"Can't you shoot to wound?" Dirk suggested. "Disarm them?"

Vikary looked troubled. "Wound them? I might wish that too, but it cannot be. No, sadly, I think we must kill Chell and Bretan if we can."

"We can," Janacek said confidently. "And, friend t'Larien, it is not so easy nor so wise to wound an enemy in duel as you might think it is. We fight with dueling lasers, friend, not with war weapons. Such sidearms fire in half-second pulses and require a full fifteen seconds to recycle between firings. You understand? A man who hurries his shot, or makes it needlessly difficult, a man who shoots to disarm—he is soon dead. Even at five meters, you can still miss, and your enemy will kill you clean before your laser is ready for a second shot."

The door opened. Dirk turned and looked up, and Janacek fell silent. Gwen Delvano stood framed in the doorway, her face and clothing streaked with dust. She looked uncertainly from one face to the next, then came slowly into the room. A sensor pac was slung over one shoulder. Arkin Ruark followed her in carrying two heavy cases of instruments under his arms.

Gwen lowered the sensor pac to the ground gently, but her hand kept its hold on the strap. "Shot?" she said. "What was this? Who is going to shoot whom?"

"The Kimdissi must leave," Janacek said.

Ruark looked around, white-faced and puzzled. He began to mop his forehead beneath his white-blond hair. "Utter trash, Garsey," he said. "What is this, big Kavalar secret, eh? A war, a hunt, a duel, some violence, yes? I would not pry such things, no, not me. I give you privacy then, yes, yours to keep." He started back toward the door.

"Ruark," Jaan Vikary said. "Wait." He faced his *teyn*. "He must be told. If we fail . . ."

"We will not fail!"

"If we fail, they have promised to hunt them. Garse, the Kimdissi is too involved. He must be told."

"You know what will happen."

"His life is at stake in this, and Gwen's," Vikary said. "They must be told."

"What is all this?" Ruark demanded.

Jaan Vikary turned again, and told him.

CHAPTER SEVEN

"Dirk, Dirk, you cannot be serious, no, I do not believe it. All along I have thought, well, yes, that you were better than them. And you say *this* to me? No, I dream, this is utter folly!" Ruark had recovered somewhat. In his long dressing gown,

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green silkeen embroidered with owls, he looked more like himself, although he was woefully out of place amid the clutter of the workroom. He sat on a high stool with his back to the dark rectangular screens of the computer console; his slippered feet were crossed at the ankles, and his chubby hands held a tall frosted glass of green Kimdissi wine. The bottle was behind him.

Dirk was on top of a wide plastic work table, his legs folded under him. "I don't see what the folly is," he said stubbornly. He still wasn't quite sure why they were there. After Vikary's long explanation and the acrimonious discussion that had followed between Ruark and the two Kavalars, the Kimdissi had stomped down to his own apartment, taking Dirk with him. But no sooner had Ruark changed clothes and quieted his nerves with a slug of wine than he insisted that Dirk accompany him back upstairs to the workroom that he and Gwen shared.

"The folly," the Kimdissi said after one sip of the green wine, "is you, dueling like a Kavalar. I say it, I hear myself, I cannot believe it! Dirk, you, a man of Avalon, this is beneath you. Think, I beg you, yes, I beg, for me, for Gwen, for you yourself. How can you be serious, tell me, I must know. From Avalon! All that history and knowledge about you, as much as left anywhere except perhaps Old Earth or Newholme maybe. You are traveled, cultured, you have seen different worlds, many scattered folks. Yes! You know better. You must, no? Yes!"

Dirk frowned. "Arkin, you don't understand. I didn't pick this fight. What else am I supposed to do?"

"Do? Why, leave, of course. Take sweet Gwen and leave, get off Worlorn as soon as you can. She needs you, yes, no one else can help. How do you help her? By killing yourself? Eh? You tell me, Dirk, you tell me."

"The duel is set. I can't very well back out now."

"Of course you can," Ruark said. "Who is to stop you?"

The door clicked open, and Dirk turned in time to see Gwen enter. Ruark beamed. "Ah, Gwen," the Kimdissi said, "come with me, talk sense into t'Larien. This utter fool intends to duel, truth, like he was Garsey himself."

Gwen came forward and stood between them. She wore pants of chameleon cloth (dark gray now) and a black pullover, with a green scarf knotted in her hair. Her face was freshly-scrubbed and serious. "I told them I was coming down to run over some data," she said, the tip of her tongue flicking nervously over her lips. "I don't know what to say. I asked Garse about Bretan Braith Lantry. Dirk, the chances are very good that he'll kill you out there."

Her words chilled him. Somehow hearing it from Gwen made it different. "I know," he said. "It doesn't change anything, Gwen. I mean, if I wanted to be safe, I could just be

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korariel of Ironjade, right?"

She nodded. "Yes. But you rejected it. Why?"

"What did you say in the forest? And later, again? About names? I didn't want to become anyone's property, Gwen. I am not *korariel*."

He watched her. Very briefly, her face darkened, and her eyes flicked down to the silver-and-jade. "I understand," she said, in a voice that was almost a whisper.

"*I* do not," Ruark said in a snort. "So be *korariel*, what is it, some word only! Then you are alive, eh?"

Gwen looked at him. "No, Arkin," she said. "That was my mistake. I thought *betheyn* was only a word."

He flushed. "All right, so! So Dirk is no *korariel*, fine, he is no one's property. It does not mean he must duel, no, utter not. The Kavalar honor code is nonsense, great high stupidness in truth. So, you are bound to be stupid, Dirk? To die and be stupid?"

"No," Dirk said. "I have to, that's all. It is the right thing to do."

"Words!" Ruark said.

"Dirk, I don't want to see you dead," Gwen said.

The pudgy Kimdissi chuckled. "No, we will talk him out of it, us two, eh?" He sucked at his wine. "Listen to me, Dirk, will you do that much?"

Dirk nodded sullenly.

"Good. First, answer me this, do you believe in code duello? As a social institution? As a moral thing? Tell me, in truth, do you?"

"No," Dirk said.

"You are a courageous man. Suicide is not needed to prove that," Ruark said.

Gwen nodded. "Remember what you said that night in Kryne Lamiya, Dirk, about life and death. You can't go off and kill yourself after that, can you?"

He frowned. "Damn it, this isn't suicide."

Ruark laughed. "No? Same thing, close enough. You think you will outduel him, maybe?"

"Well, no, but . . ."

"If he drops his sword, sweat on his fingers or such, will you kill him?"

"No," Dirk said. "I . . ."

"That would be wrong, yes, in truth? Yes! Well, to let him kill you, that is just as wrong. Even to give him the chance. Stupid. You are no Kavalar either, so point me not at Jaantony. Jaan's duels serve some purpose, eh, for his people, for us. But *your* duel is utter folly, serves nothing, just gets you dead. And Gwen stays with Jaan and Garse forever, until they lose a duel maybe, and then it is not so pleasant for her."

Ruark finished his wine, then swiveled around on his stool to pour himself another glass. Dirk sat very still, Gwen's eyes on him, her patient stare heavy enough to feel. His head pounded. The silence lay thick over the workroom.

"I won't run," Dirk said at last. "I won't. But I won't duel, either. I'll go

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there and tell them my decision, refuse to fight."

The Kimdissi swirled his wine and chuckled. "Well, a certain moral courage is in that. Utter truth. Jesus Christ and Socrates and Erika Storm-jones and now Dirk t'Larien, great martyrs of history, yes. Maybe the Redsteel poet will write something on you."

Gwen gave a more serious answer. "These are Braith highbonds of the old school, Dirk. The arbiter will rule you forfeit, and Bretan Braith and his holdfast-brothers will kill you or hunt you down. By refusing to duel, in their eyes, you'll have proven yourself a mockman."

"*I can't run*," Dirk repeated. "I promised them, Jaan and Garse."

"Promised? What? To die?"

"No. Yes. I mean, Jaan had me promise to be a brother to Janacek. They wouldn't be in this duel if Vikary hadn't been trying to get me out of trouble."

"After Garse pushed you in," Gwen said bitterly.

"They could die tomorrow too," Dirk said uncertainly.

Gwen stepped very close to him, and lifted her hands. Her fingers lightly grazed his cheeks, and she brushed gray-brown hair back from his forehead, and the wide green eyes stared into his. Suddenly he remembered other promises: the whisperjewel, the whisperjewel. And times long gone came flashing back, and the world spun, and right and wrong began to melt and run together.

"Dirk, listen to me," Gwen said slowly. "Jaan has been in six duels because of me. Garse, who doesn't even love me, has shared four of those. Despite that, you asked me to leave them, to return to *you*, to love you again."

"Yes," Dirk said. His voice was anguished. "Jaan named me *kethi*."

Ruark snorted. "If he named you *dinner*, you would jump into the oven, eh?"

Gwen just shook her head sadly. "You feel what? A duty? An obligation?"

"I guess," he said reluctantly.

"Then you've told me what my answer to *you* must be. If you feel so strongly that you have to fulfill the duties of a *keth*, how can you ask me to discard the jade-and-silver? *Bethevn* means more than *kethi*."

Her soft hands left his face. She stepped back.

Dirk's hand shot out, and caught her by the wrist. The left wrist. His grip closed around cold metal and polished jade. "No," he said.

His hand trembled. "If I do not duel," he said, "you will leave Jaan, then? And come with me?"

Her answering nod was painfully slow. "Yes."

Dirk unfolded his legs from beneath him, and they tingled to the jabs of a hundred tiny knives as the sleep and the stiffness ran out of them. He stood up, and he was decided. "You were going to do this anyway, then? It's not just because of the duel?"

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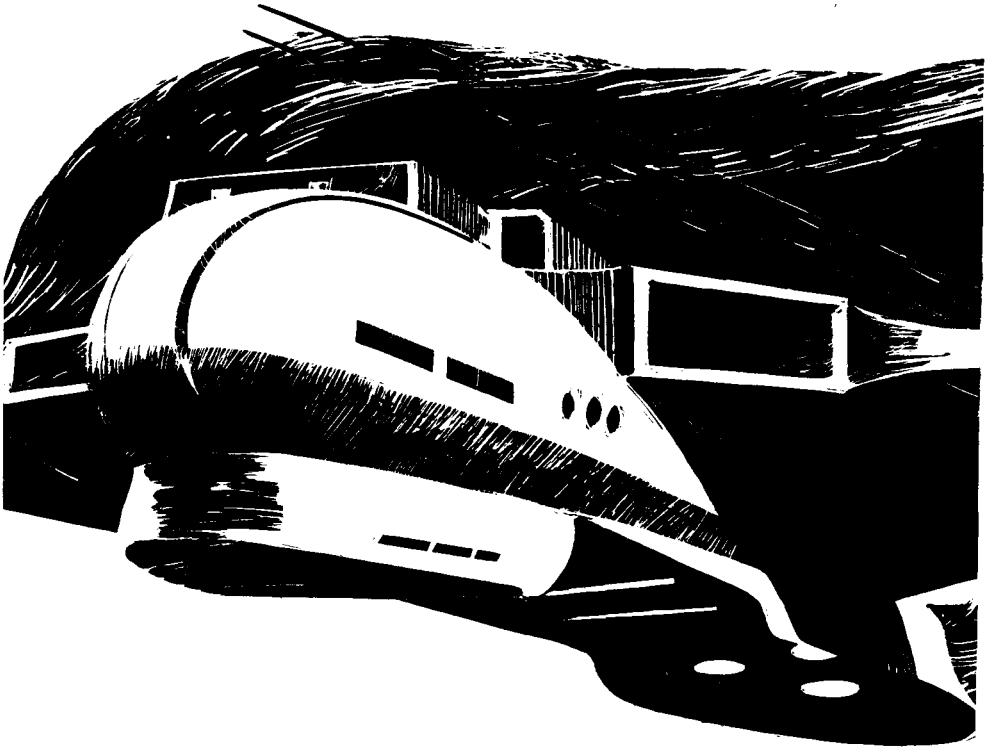

She shook her head.

"Then I'll go. How soon can we leave Worlorn?"

"Two weeks and three days," Ruark said. "No ship till then."

"We'll have to hide," Gwen said. "All things considered, it's the only safe course."

Ruark climbed down off his stool. "Go, then," he said. "I'll stay, keep watch, you can call and I tell you what happens. Safe enough for me, unless Garsey and Jaantony lose their duel. Then I'd come quick, run and join you, eh?"

Dirk took Gwen's hands. "I love you," he said. "Still. I do."

She smiled gravely. "I'm glad, Dirk. Maybe it will work again. But we have to move fast, lose ourselves thoroughly."

"All right," he said. "Where?"

They were airborne over the dark rivers and rolling hills of the Common when the first blush of dawn touched the sky, a crimson glow low in the east. Soon the first yellow sun rose, and the darkness below turned to a gray morning mist that was fast dissolving. Gwen flew; Dirk slept by her side, huddled up in a patchwork brown greatcoat that Ruark had given him before they left.

She woke him when the shining spear of Challenge came into sight

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ahead of them. At once he straightened and yawned. "We're there," he said, unnecessarily. He looked off toward the dawn. "Two suns are up," he said, "and look, you can almost see Fat Satan. I guess they know we're gone."

Challenge swelled before them. Gwen took the aircar up in a sharp ascent through a bank of wispy white clouds. The black maw of a landing deck lit at their approach and Dirk saw the numbers as Gwen took them in. The five hundred twentieth level.

"Welcome," a familiar tone said as the manta sank to the floor plates. "I am the Voice of Challenge. May I entertain you?"

Gwen climbed out over the wing. "We want to become temporary residents."

"The charge is quite reasonable," the Voice said.

"Take us to a compartment then."

"Something simple and cheap," Dirk told it. "A double bed and cooking facilities and a wet-shower will do."

The Voice deposited them in a small cubicle with pastel blue walls two levels up. It did have a double bed, which filled most of the room, plus a kitchenette built into one wall and a huge color viewscreen that filled three-quarters of another.

"Real Emereli splendor," Gwen said sarcastically when they entered. She set down her sensor pac and clothing, and fell gratefully onto the bed. Dirk stashed the bags he was carrying behind a sliding panel-closet, then sat by Gwen's feet on the edge of the bed and regarded the wallscreen.

"A wide selection of library tapes is available for your viewing pleasure," the Voice said. "I regret to inform you that all regular Festival programming has been terminated."

Gwen, behind him, was already asleep, her hands cradling her head as she lay curled up on one side.

He wanted to call Ruark desperately, to find out what had happened at the duel, who had lived and who had died. But he did not think it would be safe yet. Before they had taken off, the Kimdissi had given them the call number of a deserted apartment two floors above his own, and told Dirk to try that number just past dusk. If it was safe, he promised to be there and respond to the buzz. If not, there would be no answer. In any case, Ruark did not know where the two fugitives had gone, so the Kavalars could not possibly force the information out of him.

Too tired to sleep, restless and ill-at-ease, Dirk began to play with the viewscreen. He tried the sequence for spaceport information. There were three ships due within the next two standard months. The earliest would come in a little over two weeks; a Fringe shuttle named *Teric neDahlir*, outbound for Eshellin and the World of the Blackwine Ocean and finally ai-Emerel, its point of origin. Getting to the ship was going to be the

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biggest risk they faced, Dirk had decided. The Kavalars had virtually no chance of finding them here in Challenge, with an entire planet to search, but Jaan Vikary would certainly guess that they intended to go offworld as soon as possible. That meant he could be waiting for them at the spacefield when the time came. Dirk didn't know how they would deal with that. He could only hope they would not have to.

For a time, Dirk continued to punch buttons, but finally the game began to wear on him, and he grew bored and restive. He turned off the wallscreen, washed briefly in the waste cubicle, and then went back to the bed, flicking off the light panels. It was some time before he went to sleep. He lay in the warm darkness, staring at the ceiling and listening to Gwen's faint breathing, but his mind was far away and troubled. His Jenny was with him again, and he should be full of joy, but he only knew a sick, tired feeling. As if he had failed her once again.

Dirk pushed the thoughts aside, and closed his eyes.

When he woke, it was dusk. Gwen was already up and about. Dirk showered and dressed in soft faded garments of Avalon synthetic. Wordless, they stood together at the wallscreen.

Ruark was a long time answering, too long. Dirk wondered, apprehensively, if something terrible had happened. But just as he thought it, the throbbing blue call-signal faded out, and the plump face of the Kimdissi ecologist filled the screen. Behind him, in a grayish pall, was the dirt of a deserted apartment.

"Well?" Dirk said.

"Dirk? Gwen? Is this you? I cannot see you, no, my screen is dark." Ruark's pale eyes flicked back and forth restlessly beneath lank strands of paler hair.

"Of course it's us," Dirk snapped. "Who else would call this number?"

"I cannot see you," Ruark repeated.

"Arkin," Gwen said, "if you could see us, then you'd know where we are."

Ruark's head bobbed. He had just the slightest suggestion of a double chin. "Yes, I did not think, you are right. Best that I do not know, yes."

"The duel," Dirk prompted. "This morning. What happened?"

"Is Jaan all right?" Gwen asked.

"No duel," Ruark told them.

Gwen sighed audibly. "Then everyone is all right? Jaan?"

"Jaantony is alive and well, and Garsey, and the Braiths," Ruark said. "No shooting or killing at all, but when Dirk did not come to die on schedule, everyone got crazy, yes."

"Tell me," Dirk said quietly.

"They will still fight, but not now. Bretan Braith appealed to the arbiter. He said he had a right to face Dirk first, since he might die in the duel with Jaan and Garsey, so his

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grievance against Dirk would go unsettled. He demanded that the second duel be stayed, till Dirk could be found. The arbiter said yes to him."

"The Ironjades," Dirk said, "Jaan and Garse. Did they say anything?"

"Jaantony, no. He said nothing at all, no, just kept standing very still in his corner of the death-square—all the rest of them were running around, shouting and yelling and being Kavalar, nobody else was even *in* the square but Jaan, no, but he kept standing there looking around, like he expected the duel to start any second. Garsey, now, he got very angry. First, when you did not come, he made jokes about you being sick, then he got very cold and silent for a time, quiet as Jaan was, but later he was a little less angry, I think, so he began to argue with Bretan Braith and the arbiter and the other dueler, Chell."

"Do you know what's going to happen now?" Dirk said.

"Do not worry," Ruark said. "You two will hide and catch the ship, yes. They cannot track you down, a whole planet to hunt! They had you named a mockman—Bretan Braith demanded it, and his partner spoke about old traditions, and others of the Braiths too, and the arbiter said yes, that if you did not come to duel you are no true man at all. So they will hunt you, maybe, but you are now just another animal to kill, any other will do as well."

"Mockman," Dirk said hollowly. Oddly, he felt as if he had lost something.

"To Bretan Braith and those, yes. Garse, I think, will try harder to find you, but he will not hunt you like an animal. He swore that you would duel, duel Bretan Braith and then duel him, or maybe him first."

"What about Vikary?" Dirk said.

"I have told you, he said nothing at all, nothing."

"You've only been talking about Dirk," Gwen said to Ruark. "What about me?"

"You?" Ruark's pale eyes blinked. "The Braiths said you were mockman too, but Garse would not allow it, he talked very strong of dueling any who touched you. Roseph high-Braith waffled, he wanted to call you mockman as well as Dirk, but Garsey was very angry, and I understand Kavalar duelers can challenge arbiters who make bad decisions. So, sweet Gwen, you are still *betheyn* and protected."

"We'll call you again in a few days," Dirk said.

"Dirk, it must be a picked time, no? I am not always in this dust hole."

"In three days, then, at dusk again. We've got to give some thought to how we're going to get to the ship. I figure that Jaan and Garse will cover the spacefield when the time comes."

Ruark nodded. "I will think on it."

"Can you get us weapons?" Gwen asked suddenly.

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"Weapons?" The Kimdissi made a clucking noise. "Truth, Gwen, the Kavalar is seeping into your blood. I am from Kimdiss, what do I know of violent things? I can try, however, for you, for Dirk my friend. We will talk of it when we speak again, now I must go."

His face dissolved, and Dirk blacked out the wallscreen before turning to face Gwen.

"Voice!" Gwen said suddenly. "Is there a gun shop in Challenge? A place where we can purchase lasers, or other weapons?"

"I regret to inform you that the norms of ai-Emerel prohibit the carrying of personal weaponry," the Voice replied.

"Sport weapons?" Gwen suggested. "For hunting and target practice?"

"I regret to inform you that the norms of ai-Emerel prohibit all blood sports and games based on sublimated violence."

"I thought as much," Gwen said. "It was a bad idea anyway."

Dirk put his hands on her shoulders. "We won't need weapons in any case," he said with a smile. "And what would you really do with one anyhow?"

Gwen moved away from him and regarded him sourly. "You don't think I could kill a man?"

"No."

She smiled. "Dirk, I'm not the little girl you knew on Avalon. In between then and now, I spent several years on High Kavalaan. They were not easy years. I've had other women spit in my face. I've been called mockman and *betheyn*-bitch by other Kavalar men so often that sometimes I find myself answering to them." She shook her head. Beneath the broad headband pulled tight across her forehead, her eyes were hard green stone. Jade, Dirk thought inanely, jade as in the armlet she still wore.

Her arms were crossed tightly across her chest and she was frowning, but she stopped. She must have seen the expression on his face, Dirk thought. He wondered what it was.

"Maybe you're right," she said after a little bit, uncrossing her arms. "Maybe I couldn't kill anyone. But, you know, I feel as if I could sometimes. And right now, Dirk, I would very much like to have a gun." She laughed a small unfunny laugh. "On High Kavalaan, of course, I wasn't allowed to go armed. Why does a *betheyn* need a sidearm? Her highbond and his *teyn* protect her. And a woman with a gun might shoot herself."

The room lights flickered briefly, dimmed, then flared back to full intensity. "What?" Dirk said, looking up.

"Residents should not be alarmed," the Voice said in its even bass tones. "A temporary power failure affecting your level has now been rectified."

"Power failure!" Dirk echoed.

"Please do not be alarmed," the Voice repeated, but the overhead

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lights gave the lie to its words. They went out entirely, and for a second Gwen and Dirk stood in frighteningly total darkness.

"I think we had better leave," Gwen said when the lights came back on. She turned and slid open the wall panel and began to remove their bags. Dirk went to help her.

"Please do not panic," the Voice said. "For your own safety, I urge you to remain within your compartment. Challenge has many built-in safeguards, as well as backups for every important system."

They finished packing. Gwen went to the door. "Are you on secondary power now?" she asked.

"Levels one through fifty, two-fifty-one through three hundred, three-fifty-one through four-fifty-one, and five-oh-one through five-fifty are on secondary power at present," the Voice admitted. "This is no cause for alarm."

"I don't understand," Dirk said. "*Why*? What's the cause of the failures?"

"Please do not be alarmed," the Voice said.

"Dirk," Gwen said calmly. "Let's go." She went out, a bag in her right hand and her sensor pac slung over her left shoulder. Dirk picked up the other two bags and followed her out into the cobalt blue corridors. They hurried toward the tubes, Gwen two steps ahead, the carpets swallowing the sounds of their footfalls.

"Emergency regulations are now in effect," the Voice said. "Warders have been dispatched to conduct you back to your own compartment. This is for your own protection. I repeat, warders have been dispatched to . . ." The words abruptly began to slur, and the bass voice rose and squeaked and became a grating whine that clawed briefly at their ears. It ended in a sudden shuddering silence.

The lights went off.

Dirk stopped for an instant, then took two steps forward in the thick darkness and bumped into Gwen. "What?" he said. "Sorry."

"Quiet," Gwen whispered intently. She began to count off the seconds. At thirteen, the hanging globes at the cross-corridors came on again. But the blue radiance was a dim ghost glow, barely enough to see by.

"Come on," Gwen said. She began walking again, slower this time, treading carefully in the blue gloom. The tubes were not far ahead.

When the walls spoke to them, the voice was not the Voice.

"This is a large city," it said, "yet it is not large enough to hide you, t'Larien. I am waiting in the lowest of the Emereli cellars, the fifty-second sublevel. The city is mine. Come to me, now, or all power will die around you, and in the darkness my *teyn* and I will come hunting."

Dirk recognized the speaker. He could hardly be mistaken. On Worlorn, or anywhere, it would not be easy to duplicate the twisted, rasping voice of Bretan Braith Lantry. ■

TO BE CONTINUED

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selling the promised land

By the same kind of thinking that produced "The Vatican Rag . . . "

Jim St. Clair

Jack Gaughan

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I am a busy man. We're not number one for nothing. It takes a hell of a lot of work, pizazz, and on-the-toes attitude. So I knew when my PS (private secretary, for the uninitiated) put a call straight through to me, it was important.

"Yo hi!" I burbled in enthusiastic greeting. If nothing else, always be enthusiastic. It covers a multitude of sins.

"Kadir, this is Fenton," I was momentarily annoyed. Fenton is my brother. Why the hell was my PS letting a personal call slide through?

"Brother, how flies the kite?" My brother is a Brother. That's why I addressed him so. He is a Jesuit. I try to be tolerant.

"How flies the . . . oh, I understand. My kite is flying fine, Kadir. Listen, I am speaking to you as a representative of the Church. We would like to retain you . . ."

Woman's throaty voice: *Men, flaunt your masculinity. Let your women know you've got it. When you use a depilatory on your face, follow it up with the scent of sex: Gotcha. Gotcha, the after-depilatory cologne that says, 'I've got it all'. Gotcha, whose key ingredient is the sex hormone of a swordfish, says 'I've got you'. Gotcha: paralyzes the caution center of a woman's brain and drives her wild. When you wear it, you say to her, 'Gotcha'.*

There was a silence from the other end following the commercial, so I filled in. "That was one of ours. How did you like the imagery?"

"I'm sorry, I have never adjusted to telephone commercials. They interrupt my train of thought."

"It's progress, Brother Fenton, progress."

"Perhaps. What I called you about was a problem the Catholic Church is facing up to. The leadership has concluded that we need the services of Delaney, Quiggle, and Waggamun. I was deputized to speak to you because of our relationship. We . . ."

Male Voice: *Don't be a boozer. Boozers are losers. Alcohol lovers lose their livers. Instead, my man, have a joint.* Female voice: *I'm Miss Maryjane of 1993, inviting you to live life high—on Maryjane Marijuana, the number one selling marijuana sticks. A blend of the finest Turkish and Mohave marijuana, specially cut to draw easy. So don't be a drag, have a drag.* Both together: *Maryjane Marijuana: It's the highest!* Male voice: *Now we return you to your conversation.*

My voice echoed my disgust. "That was a New Trend commercial. Did you hear that amateurish copy? Absolutely gauche. I'm surprised they even clear garbage like that."

"I don't approve of using, as you know, Kadir."

"Damn straight! If you want to get zapped, you should use alcohol, as God intended. We handle only beer, wine, and whiskey accounts."

"That's not what I meant. But let me tell you this before the next interruption. You are no doubt aware that

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membership in all churches is decreasing."

"Yeh. There's even a new organization called the Reformed Atheists who are claiming tax-exempt status as a religion. By Christ, it's enough to make you puke! Sorry, Fenton, we tend to get a little coarse in this business."

"I agree. Well, the Catholic Church has suffered declining congregations also, and it's cutting into our holy mission because revenues are decreasing drastically. We may even . . ."

Woman's voice: *Another service of your WorldWide Telephone Service, the company whose last word is service. To help reduce the cost of telephone service to you, we occasionally broadcast inoffensive commercial messages from your neighbors, the merchants of the world. If you are interested in purchasing time on the telephone, simply dial 'O' and a customer representative will be glad to share with all of you the innovative ways you can talk to the people. And for you who are consumers, let your ears do the shopping on the telephone, just as you've always let your fingers do the walking in the yellow pages.*

"Arggh!"

"I beg your pardon, Fenton?"

"It is *impossible* to hold a civilized conversation on the telephone anymore. Can I meet you this afternoon in your office to discuss this?"

"Brother Fenton, I'm a very busy man. We're approaching the Christmas season and that's our peak

The Battle for Andromeda—($12.95), Conflict for a Trillion Suns, involves the entire Galaxy, Omega Ship-Dreadnaughts (9,000 miles across) that can destroy 100 solar systems in a single move! The mere presence of an "O" ship, 10,000 light years away constitutes an act of war! A series of games, involving Humanoid, Computer, Alien, Cyborg Cultures, their own history and unique weapons systems, fleets, cloaking devices, nucleon missiles!

Warriors of the Dark Star—($12.95), in the Age of the Neutron Wars: a tactical series using enlarged models of *Omega, Alpha, Beta ships in ship-to-ship combat with all* weapons, rays, computers, in immense scale. Complete games in themselves, both series can be extended, so the size and scale of these games are unlimited! The boards are **REAL** star systems. **NO DICE, NO CHANCE!** Special new unique play systems for the wargamer, never used before!

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period as you well know . . ."

"It used to be mine as well."

"Yes, of course, but the trouble is . . . ah, shit, come on over! What are brothers for, after all?"

"I have often wondered."

That afternoon, my brother and three associates were ushered into my office. I had understood that only Fenton would be there, but, in the spirit of Christian charity, I let it pass. Fenton introduced the three as Bishop Lon Carpelli, Elix Cardinal Vidriff, and Father Morton Jones. I waved them to chairs and took my throne behind the massive plasti-oak desk that is the envy of so many.

Fenton gave the preamble. "Kadir, I think I ought to tell you that I do

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not approve of this action, but my dedication to the Church creates in me an obligation to support the will of my superiors. I trust that I am wrong and they are right in coming to you."

The little prick always was ashamed of his familial ties to the world's most successful advertising agency. Our father, Clinton X. Delaney, was one of the driving forces in building this agency to what it is today. A God-fearing capitalist, he religiously gave his Sunday mornings over to attending church, even on days when he gave up his Sunday afternoon pro football. He raised us as Christians, unfortunately succeeding too well with Fenton.

"Brother Fenton, no apologies are necessary. I only thank you and these fine gentlemen for coming to me. I pride myself on being a religious man."

"Yes, of course, Kadir. That's why we hope you are capable of providing the dignified approach we need."

"Was your brother able to explain what we want of you?" Cardinal Vidriff asked.

"I think the gist of it is that sales—I mean, attendance is slipping, revenues are off, and you may have to reduce operations as a result."

"Yes," the Cardinal said, taken aback by my bluntness. "That is a succinct way of putting it. Somewhere along the way, society has taken a turn away from Christianity and toward materialism. People have turned from faith to science, a godless science that demands verification for everything, even God."

"It is the influence of that devil commercialism," hissed Father Jones, who must have been eighty if a day. "People are more interested in things, in possessions, than they are in their own immortal soul."

"Excuse me, padre, but I think you're wrong."

"Eh?" he said, staring at me, obviously not used to being contradicted by a mere parishioner.

"Your big handicap isn't materialism; it's attention. We have experienced a communications explosion in this century. It was less than a hundred years ago when Christianity or any religion had no real competition from any other communication source. Then along came radio, motion pictures, television, home videotape libraries, and video billboards, all clamoring for our attention. The variety of competing stimuli is staggering. There is no reason even to be bored today because there are far more communicative stimuli than you could possibly receive.

"Now that's the cause of the problem. We don't have enough time to give full attention to every stimulus available, so we must make choices. You follow the drift of this? Choices."

"I'm not certain I fully comprehend the significance of this," the Cardinal said.

"And therein lies your failure, gentlemen. The Church has failed to

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grasp the significance of attention and choice. Before, the Church never had to concern itself with choice, so it never really competed. The only recognized competitor was the devil, and we all know his product was inferior, isn't that so?

"But along came other choices, not so obviously undesirable. In fact, many have enriched our lives. Business first realized that we were in the midst of a communications explosion. Industrial leaders recognized that the only way to get the public's attention was to package the message in more attractive or compelling wrappings. That was the birth of modern advertising. You'll notice the best commercials first get your attention, then present the message. If no one is listening, your message is lost. It's a two-step process: attention/communication, which we hope will lead to step three." I winked, because everyone can figure out what step three is. They all just stared.

"Look, for years the Church has presented the same drab message, with no attempt to gain the public's attention. Your basic religious tagline is redemption, right? I mean, that's what you have to offer. Redemption, the acceptance by God when, after a life of sin, you renounce your previous actions to a forgiving God and are welcomed into Heaven. Yes, I'm deliberately being crass. But what kind of product is that for someone to give their attention to? Good lord, we do a better job of selling life insurance, and that doesn't even offer immortality."

Bishop Carpelli, who is the big melon in the patch for the Society for the Preservation of the Faith, said, "I think we agree that is basically our weakness. People are ignoring the message and with this ignorance has come a general deterioration of morals."

"That's what's wrong with the world today."

"Indeed, Mr. Delaney. But we are at a disadvantage. Immorality, unfortunately, has always been a more persuasive way of life."

"No sir, padre, there's where I disagree. You of all people should know better. The good life is your easiest product to peddle. It's just, no offense intended, that most of its supporters are stuffy, moralistic hypocrites who turn your average citizen off. But people want to be good. You just have to appeal to the correct values."

Bishop Carpelli seemed pleased. "You have the proper attitude for this project. I think you may be the man we are looking for."

"I'm not so sure," said the grumpy old Father.

"I agree," said Cardinal Vidriff, throwing his lot with me, and that seemed to settle the issue.

"Fine, then we can work up a presentation for you and decide terms for the campaign in two weeks at this time. If we don't move fast on the publicity, it'll get lost in the big Christmas campaigns."

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"God preserve us," said my little brother.

"Brother Fenton," I replied. "Negativism destroys creativity."

In two weeks, a group of seven clergymen gathered in the Presentation Room to see that I had kept my promise to deliver. Of course, it wasn't easy. I had to carefully gather a creative staff which could put together a campaign that avoided the vulgarity that regrettably invests itself in some projects. Religion, I told them, is not something that lends itself to heavy-handedness. Subtlety is what we want. It should grab you, true, but gently, as a caress. And, above all, it should reek class. The Catholic Church should be synonymous with class. It was, after all, the first company to work that side of the street.

In spite of the example I set in my dignified approach, the graphics and copy creators did not produce uniformly sophisticated ideas. Worldly, yes, but sophisticated?

Kegel and Lita, our husband and wife graphics/copy team, presented a perfectly horrendous series of pictures showing a grotesque devil beckoning to the reader, standing next to Christ on the cross. The caption read, I josh you not, "Don't Cross the Man on the Cross. Let Him lead the Way. Now playing every Sunday at your local Catholic Church."

"What is this?" I roared. "Are we merchandising our local motorcycle gang? Holy shit, I wouldn't take my kids anywhere near a church after seeing that!" A temper display is mandatory in turning out a good campaign theme. It keeps the soldiers on their toes.

Anton and Lex took a different approach, equally as ruinous. Their lead was *The Bible is Life*. "Every week another exciting chapter revealed. Murder, pillage, rape, and incest, all discussed in detail. Learn to live a better life by seeing how others lived in sin. Religion can be fun." The slogan *Religion Can Be Fun* was the right idea, but I decided they had gone too far with incest. There were still too many people opposed to that kind of activity, and I count myself among them.

Then there were my two pillheads, Ruél and Sky-Hy, who I kept around for sudden bursts of unusual creativity. I had to take them off the project because the best they could do was "Freak out with God," after contemplating stained glass windows all day.

Of course, that was only three days into the two weeks. Everyone was swinging to the same tune by the time that our deadline was reached. And now I, acting as the salesman for this particular presentation, was prepared to give my multimedia preview to the four previous clients plus Monsignor Ruella from the Vatican and two other high muckymucks from the American Catholic hierarchy.

I began: "Gentlemen, and I think it's significant that you are only gentlemen. That there are no token ladies present demonstrates how far

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out of touch you have drifted." It is important to keep the clients at least a bit off balance. The room semi-darkened and a slide of Michelangelo's God of Creation from the Sistine chapel ceiling appeared behind me. "You see before you the ultimate father figure: God. And now a picture of Jesus Christ at the Last Supper. Note that Christ plays a father image to the twelve disciples. You have here a natural asset in your campaign, right?"

I paused to give someone a chance to answer. It was old Father Jones who finally intoned, "We all see the advantage of God as a father figure."

I pounced. "Wrong! Thirty years ago, father figures were in. People responded best to authority. But the Vietnamese conflict and a rash of corrupt leaders throughout the world fostered an antagonism toward authority. Your greatest deficit right now is the father image. And, if you will pardon the bluntness, your sect of Christianity is most flagrant in stressing authority in the person of the Pope."

"See here!" said the Vatican rep on cue. "We are not here to restructure our Church government!"

"Nor should you be. I'm a good Catholic. Never missed a Mass in nine years. We're not talking about what the Church *should* be, we're interested in what it *seems* to be. So, while we won't change the Church, I plan to stress only the salable qualities."

"It would be immoral to lie about ourselves, remember," little brother inserted.

"I'm surprised at you, Brother Fenton. A member of the family! You know we don't lie at Delaney, Quiggle, and Waggamun."

"What about the dog food commercials for an all-meat brand that claimed it was superior to the more nutritionally-balanced dog foods with cereal?"

"You know that ad said dogs liked all-meat more, not that it was better for them. That's not a lie! That's called puffing, stressing the plus qualities of your product. Puffing is perfectly legal."

"So you propose we puff the Church?" asked the Vatican incredulously. I didn't like the direction in which we were drifting.

"I don't think I'd put it so crudely." I signaled for another slide. A Bible appeared behind. "The foundation of all Church doctrine is in this one book. But it has come to symbolize far more than that. It is used in the form of scientific verification of Christianity because the Church professes it is the word of God. This becomes a classic example of circular reasoning."

"We are aware of the logical fallacy in that claim," said Father Jones derisively. "Any college sophomore can tell you that because the Bible says it is the word of God doesn't prove it so. You are out of your field now."

"Quite to the contrary, padre. You

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recognize the fallacy, yet you perpetuate it. Now it enters my province. I plan to do something about it. The world today demands scientific proof for everything, right?"

"We know that. That's why we're here," sighed Cardinal Vidriff.

"Wrong. That's a common misconception of contemporary society. People do not demand factual support for everything."

"If they did, you'd be out of business," Fenton interrupted.

"I'll ignore the spirit of that statement and accept it. It's true. Your average consumer has two criteria in mind when watching a commercial. The one is an honest presentation of facts with proof and documentation. So you'd be better off presenting no evidence at all if you have only substandard evidence. The other criterion is what I like to call the dream quotient. Consumers are also interested in what potential the product has for them emotionally. We don't do things just because they're logical. We act as we do out of hope or enjoyment or because it boosts our egos.

"Now I'll tell you the sin your basic Bible claim commits. It purports to be scientific. It makes a statement of fact. Who in hell really believes the Bible was written by God? Come on, is there anyone who believes everything in the Bible is accurate?"

"Accurate as what?" someone asked.

"Precisely. That's the key to it. Parts of the Bible serve different purposes. And that, congregation, is where you've fouled up. You've given the people an authority figure when they've grown to distrust authority, based on a document that is obviously more anthology than pure theology. And you've presented it to them from a take-it-or-leave-it position of moral superiority which is designed to turn off all but the true believers."

The room was silent when I finished. I sipped some water, knowing that I had scored my point as usual. It's my business. "That's quite an indictment you've made," said the Vatican. "I expect you have some solution."

"Several. This session today is to present them to you and allow you to make your choice."

"Or reject them all," said Fenton.

"We prefer to practice more faith," I replied and received a few chuckles for the effort. "We established as our preliminary slogan for this campaign 'Church is another word for life.' The primary concept of all these presentations is that religion is a participating activity, not a passive one, practiced one day a week." Several murmured their approval.

"Our first firm recommendation is that the Church avoid commercial spots. It would seem too much like we were selling Christianity in nonreturnable bottles. What we settled on instead is, if you'll pardon my immodesty, pure inspiration. We need to mount a weekly program

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with religion as its main subject."

"We all have one of those," sneered the Vatican. "You can watch them on Sunday mornings."

"And nobody does, right? I'm talking about a prime-time program, one with a large audience. One, in short, which is actually entertaining, not a heavily moralistic parable like you see on Sunday morning.

"We had several ideas for the format of the program. One possibility (film, please) is an anthology of semimusical stories about the saints, beginning with the apostles and working our way down." The film showed a credit reading "Your Cavalcade of Saints," followed by a chorus of nuns singing the opening jingle, not bad for being whipped together in less than a week. Then the announcer intoned, "And this week on *Your Cavalcade of Saints*, we answer the musical question, why would a physician leave his practice of healing bodies to heal souls for God, when we present our salute to St. Luke."

Their eyes glazed. I had a hunch that wasn't going to be the appropriate presentation, so I abruptly signaled a halt to the film. Anton and Lex would feel they hadn't received a fair hearing, but I didn't want to witness a modern exodus.

I quickly filled. "That's an example of undisciplined creativity. There might be an idea or two there that might click, but I suspect the other presentations will be more to your liking.

"Our second program is entitled *One Big Happy Family*. We try to bring religion into the home by pre-

in times to come

Many months ago we mentioned that there are plenty of women writing science fiction and science fact. To prove the point, we're going to do a very chauvinistic thing next month: June's Analog will be a special All Women's Issue.

With the exception of the third installment of George R. R. Martin's novel, and the Brass Tacks column, every part of the June issue will be written by women.

The Guest Editorial will be about the social aspects of space colonization. The science article will be on the recent discovery that there *was* a planet between Mars and Jupiter a few millennia ago.

The lead fiction will be a strong novelette by Joan Vinge, with an equally strong cover painting by John Schoenherr. All the other stories will be by women, and the book review column will be by Sonya Dorman. We still have not found a plethora of women science fiction illustrators, but there will be one in June's issue: a new illustrator, Janet Aulisio.

(Editorial Apology: As you well know by now, we were forced to drop Stanley Schmidt's novelette from our May issue, due to layout problems. The novelette will be in our July issue . . . honest!) ■

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senting a light touch."

The film began with a scene of a large neocolonial house, built sometime in the middle of the century. Kegel did the narration himself. "*One Big Happy Family*, a program that will combine humor with pathos. *One Big Happy Family*, a program which will deal with serious subjects in an entertaining fashion." The camera moved slowly toward the house. "Here we have the MacIntosh home, where your typical Catholic family resides. We have the parents, Joe and Mary (notice the subtle symbolism) and the four typical children—Patrick, who is in seminary, studying to be a priest; Sarah, who is studying to be a nun after turning her back on a budding career as lead singer for a local rock band; Buddy, a junior in high school with your typical high school problems; and Karyl, the married daughter, who occasionally returns to mother for advice on raising her little Abel.

"Imagine, if you will, the amusing yet informative situations members of our typical family can become involved in." Picture of a confessional. "Pat, while learning the procedure as a priest, is accidentally locked in a confessional. Lots of warm chuckles during this episode plus information about the process of confession." Picture of a sailboat. "Sarah, the nun, while taking a party of children on a boating trip to an island, has the boat slip off its mooring. Fortunately she has her guitar with her and calms the children with songs and stories about morality."

Well, I won't go on with the description. Suffice it to say, there were other witty plot outlines. But the group looked dissatisfied, so I turned to idea number three, my own favorite.

"What is the most enduring form of entertainment on television which also deals with information?" No one would even hazard a guess, so spellbound were they now. "Quiz shows! Particularly quiz shows with Hollywood celebrities. Audience involvement is big too. Now couple these features with large prizes *and* home audience participation and what do you have?"

"A disaster," said Fenton, an otherwise pleasant fellow, but always one for the cheap shot.

"You have the Celebrity Catholic Church Challenge Quiz (or whatever you choose to call it). Picture this, (I don't have any slides for this one): a celebrity is teamed with a contestant chosen at random from (and here's the cleverest gimmick) those members of the viewing audience who filled out an attendance card at Mass the Sunday before. Two teams now attempt to be quickest to answer Biblical or doctrinal questions. Each week the winning team receives big ticket prizes, probably donated to the cause by those companies who want their credits to appear at the end of the program. Obviously, anyone who regularly attends church will have the best shot at winning.

"Now it gets even better. Each

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week's winners can return for the big challenge rounds every thirteen weeks. I picture maybe even the Pope being present for that superchallenge round."

I looked at seven faces all registering undisguised horror. Father Jones was standing to leave.

"Wait, there's one more program idea you should hear."

Father Jones glared. "Why? I should think you've already plumbed the depths of bad taste."

"That's your particular bias. I would remind you that Delaney, Quiggle, and Waggamun has a better track record recently than does the Society for the Propagation of the Faith."

"Let's hear him out, Father," said the Cardinal.

"This last project idea doesn't have the high probability of success that the other three have, but handled properly, may be the compromise you're looking for. The program would be called *Bible Story*. It would feature a young priest traveling across the country in search of his half-brother, who was separated from him at birth in a foundling home. During his wandering, he is met with a different moral crisis every week. By flashback, he recalls passages from the Bible which paralleled his situation and learns from them the proper course of action to take. He might even quote words from the Master. If we could cast major stars as important persons in the Bible, this show could be a hit."

"Why does that plot seem familiar?" asked the Bishop.

"I don't see how it could. We're noted for our original ideas." I could see they were interested for the first time all afternoon. "To guarantee the success of this program, it is essential that the wandering priest be authentic. I would suggest casting a real priest in the role. Someone like my brother, for instance, since he has had extensive theatrical experience while in high school and college before going to seminary."

From then on it was roughing in the details. You'll notice that with a change here and there, this is a description of the second season's new hit show, *The Wandering Padre*. What you don't know is that the credit "Father Mike Malone played by himself" is not accurate. Fenton Delaney insisted on a stage name as a condition for accepting his assignment. He no longer speaks to me, probably because he is so busy, and has hidden his gratitude for this opportunity well. Church attendance is already increasing by more than 5% a week. I look for Easter to be up at least 50% over last year.

Tomorrow, a representative of the Consumer Protection Association has an appointment to see me. I have always been a supporter of consumer protection. After all, I'm a consumer too. They have undoubtedly come to us to avoid a tasteless campaign that some other agency might develop. After all, the avoidance of bad taste is our credo. ■

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A Calendar of Upcoming Events

log

2-5 May 1977
Offshore Technology Conference at Astrodomain, Albert Thomas Convention Center, Houston, TX. Info: Meetings Inquiries, I.E.E.E., 345 East 47th Street, New York NY 10017.

6-8 May 1977
KWINTUS KUBLIUS (Upper South Regional SF Conference) at Quality Inn Parkway, Nashville, TN. Guest of Honor—Harlan Ellison; Master of Ceremonies—Andrew J. Offutt. Registration $7.50 in advance, $8.50 at the door. Info: Ken Moore, 647 Devon Dr, Nashville TN 37220.

28-30 May 1977
ERRATICON at the Hilton Inn, Houston, Texas. Science Fiction conference. Guest of Honor—Ben Bova. Registration $3 until 1 April 1977, $5 thereafter. Info: Clifton B Davis, 2602 Cherry Lane, Pasadena TX 77502.

5-9 July 1977
Crystal Balls and Computers: How to Predict the Future featuring Ben Bova at Rensselaerville, NY. Info: Terri Rapoport, Campus Programs Coordinator, The Institute on Man and Science, Rensselaerville NY 12147.

10-14 July 1977
The Future of Education featuring Isaac Asimov at Rensselaersville, NY. Info: Terri Rapoport, Campus Programs Coordinator, The Institute on Man and Science, Resselaerville NY 12147.

through August 1977
LOVELIGHT—a laser musical at the Charles Hayden Planetarium, Museum of Science, Boston, MA. Display of laser light, color and music. Tickets are $3. For times and ticket information call 617-723-4586.

1-6 September 1977
SUNCON (35th WORLD SCIENCE FICTION CONVENTION) at the Hotel Fontainebleau, Miami Beach, FL. Annual gathering of the SF World: panels, talks, films, masquerade, art show, discussions. Presentation of the SF Achievement Awards (Hugos) and the John W. Campbell Award for Best New Writer. Guest of Honor—Jack Williamson, Fan Guest of Honor—Robert Madle. Write for registration information. Join now and vote for the Hugos and Campbell Award. Info: SUNCON 35, Box 3427, Cherry Hill NJ 08002.

—ANTHONY R. LEWIS

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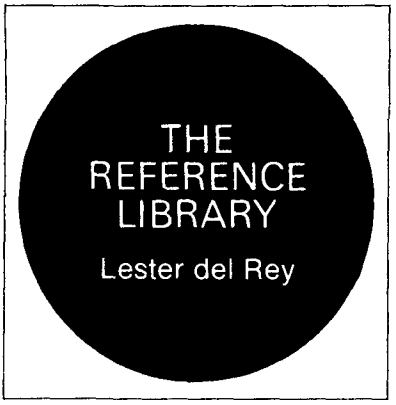

WHAT'S IN A NAME?

As I remember it, Shakespeare asked that question and then went on to indicate that names didn't mean much. Fine. But he also wrote something about a sweet young girl named Juliet, where the whole problem of the play lay in her having the wrong last name. Maybe like most writers—with the exception of book reviewers, of course—he didn't always believe everything he wrote.

Well, right now it suddenly turns out that I may have the wrong last name for a respectable reviewer of science fiction books. It's a name that may indicate some conflict of interest.

When I first became reviewer for Analog, several people thought there was already a conflict of interest. Barry Malzberg was more honest than most, since he wrote me directly about it. You see, Ballantine Books had as their science fiction editor someone named Judy-Lynn del Rey, who happens rather happily to be my wife. And Ballantine, next to DAW Books, was the largest publisher of science fiction.

Now Ben Bova and I had already agreed on a policy to protect the readers from some obvious conflicts of interest. I don't review books that I have written or edited—nor those he has written or edited. (And he's written a couple I'd have enjoyed reviewing.) Aside from that, I've done exactly what I've always done: reviewed the books that particularly interested me, either pro or con, regardless of who published or edited them, whenever they were sent to me for review. (So-so books are generally better neglected, I feel.)

Some of those have been edited by my wife. That hasn't worried me at all. She and I agree a fair amount of the time, but I feel free to disagree; she's an adult and she's had magazine experience, so she doesn't expect a review column to be part of her publicity department. Last month, for instance, I gave a negative review to a book she was particularly pleased with, and I got no pressure against my doing so. I've also reviewed more DAW books than those published by Ballantine.

However, to complicate matters, I'm also an editor for Ballantine. I've been hired to edit a line of fantasy books, and I make no secret of the fact that I'm trying to bring out a line that will make fantasy as popular as science fiction. But since the fantasy I edit has little connection with science fiction, I don't feel there's any loss to the readers when I don't review it. And nobody at Ballantine has ever put any pressure on me as to my reviews, despite the checks they send.

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Now, however, something has come up that is going to appear a bit irregular in the review columns. The Ballantine science fiction and fantasy are going to be issued henceforth as DEL REY Books! And instead of three a month, there are going to be six a month, plus an extra six once a year. That will mean more books to choose from, and probably more books under that name will be reviewed here.

In case anyone is interested, the idea belongs to the publisher. He felt that science fiction and fantasy are too important a part of the company's business to receive normal treatment. They had to be set apart as separate publications, able to deal with distributors and bookstores on a more independent basis, with their own monthly leaders. And because both my wife and I are editing all those books—and probably because the name made up into an easy, and distinctive colophon—he chose to name them after us. It's good for publicity, too.

So my reviews in this column will often concern themselves with books that carry my name as the publisher.

Obviously, as readers of the magazine, you have the right to be suspicious or to object. If you do, you can write to the editor, letting him know how you feel. And I assure you there will be no hard feelings on my part against those who do protest. I'll be very much interested in your reaction.

To bite the bullet—or in this case, the sword—let's turn at once to **My Lord Barbarian,** by Andrew J. Offutt (Del Rey Books, 192 pp., $1.50). This is the type of book I call sword-and-planet, sort of a mixture of space opera and sword-and-sorcery, without sorcery. Usually, I find such books pretty routine, but I'm a sucker for a really good one. And Offutt seems to turn such a book out now and then. This one is what can only be called a romp, a lovely piece of pure entertainment, carried along with zest.

It has all the elements. There's a lovely cockeyed system of planets, six of which circle like moons around the major one. All are kingdoms of one sort or another with highly varied rulers, while the central world is the seat of the empire. There are remnants of an ancient high technology, mostly lost now; but they still have spaceships which go to whatever world is push-buttoned on the panel, though nobody knows quite how they work. And one world is pretty savage, largely peopled by barbarians. There are also such things as lovely princesses and slave girls.

Valeron is the barbarian who has finally conquered all his planet and brought it under the control of the empire. Now as the conqueror, he brings his band to pay homage to the emperor, an old friend of his father. And he no sooner walks into the palace of the emperor than the cry goes up: "Seize that man. He has killed the emperor!" So he's seized and locked up. No, he doesn't escape by a clever trick; he's rescued—with considerable ingenuity—by the emperor's daughter, who hides him in her quarters. She's practically a prisoner within the palace herself,

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and he's got to get help, provided he can save himself.

Sound routine? Well, most of the elements are. But Offutt hasn't handled any of them routinely. The princess is no cloying damsel, by any means. The set up is nicely complicated. The other rulers are an interesting bunch, and their worlds are a lot less routine than most in more serious books. And the whole love interest manages to avoid either the banal or the treacly.

Offutt writes it precisely as it is--a book that can be a lot of fun, with strong plotting of the sword-and-planet variety used to form the background for a lot of interesting developments. I liked his worlds and their rulers, I enjoyed his tricks, and I found his characters fun to follow. A fine adventure novel.

Ace Books continues to reissue some of the best books from their back list. I'm delighted to see **Space Viking** by H. Beam Piper (243 pp., $1.50) back in paperback form. It's been a dozen years since it was originally available. And to me, it has long been one of the best adventure novels in our field. Apparently many agree: when I selected a list of forty-five novels for the Garland Library of Science Fiction, this book--at $11 a copy--drew more orders than any other!

Superficially, the background here is familiar. A galactic empire has broken up in the past, with worlds returning to barbarism or forming tiny empires that decay in war. But one group fled early far beyond the empire and set up a feudal culture that has kept its technology. Now men from these worlds go out in their great ships to loot other worlds, as savagely as the real Vikings looted the countries of old.

Lucas Trask decries this until Andray Dunnan shoots up his wedding, kills his bride, and flees in a ship to go Viking. Trask buys himself another ship and sets out seeking vengeance. But space is vast and communication slow. It may take years to locate Dunnan. So Trask sets down on a primitive world and makes it his base, going looting to furnish it. And looting here is no mere romantic frippery. Piper makes it as ugly as it would be, with marvelous details.

And from there on, the story departs from the obvious and develops both a genuine purpose and a life of its own.

Piper was a thoughtful man with strong convictions about the human condition. And without preaching, he worked much of his philosophy and historical interest into this novel. It becomes a study of what civilization is and how it builds and decays. Unlike most novels, it's damned relevant--without ever losing its universality or going in for current fads. If you haven't read it (or haven't read it for years), this is a book that should definitely be on your list. I've read it half a dozen times without losing my joy in it.

One of the great tragedies of science fiction was the fact that Piper not only talked a strong personal philosophy of dignity and self-reliance but also lived by the code. He also died by it, of his own hand, just at the time he was reaching his peak as a writer. There were brilliant

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novels in his head which will now never be written. But there's some consolation in having available those words that he did complete.

This month has seen a rash of nonfiction books come my way. Most of them are the usual glut of occult-interest books, of course. I'll never understand why many publishers seem to think that a science fiction reviewer should be interested in a distorted recap of the ideas of Mme. Blavatsky or the latest in flying saucers. But some of these have been related to science fiction or serious science.

The Electric Wishing Well by Joseph J. DiCerto (Macmillan, 317 pp., $12.95) is an excellent example of a book meant for the general reader which covers a field of technology.

In this case, the subject is energy—our requirements, our available sources, and everything about it. DiCerto covers almost everything in admirable detail and clarity, from wind power to nuclear fusion, including various ways in which such energy sources can be used more advantageously.

This isn't a doom book, crying about our dwindling reserves. He covers such things, but the general tone is reasonably optimistic. He takes the stand that we can't go on exactly as we are, so we have to see what sources of power are available—not merely as theories, but as practical sources we can achieve at acceptable cost and within reasonable time. And his conclusion is that it is possible to solve the energy crisis without any radical new discoveries or engineering developments. I believe he proves his point, too.

The writing is clear, and there are enough diagrams to make the more difficult subjects understandable to any layman. In the case of the current nuclear fission controversy, he gives both sides of the argument, first listing the pro-fission arguments, and then examining the reasons against building many more plants. And wisely, I think, he looks for and finds alternates for fission.

One of the better features of the book is that it is geared to finding the solution for each locality, rather than a single plan for the whole nation.

There are areas for individual judgment, of course, and perhaps no reader will wholly agree with all his conclusions. I could wish for less discussion of electric automobiles and perhaps something on the development of alcohol-powered steam engines. (I know these aren't supposed to work for cars; having ridden in a car operated by a steam engine that was as convenient and in many ways better than a gasoline internal-combustion engine type, I can't quite accept the objections.)

But such quibbles are unimportant. It's a truly excellent one-volume treatment of the whole energy situation. It should be a textbook for any who feel they have insight on the problems of today and for all government planners.

Who's Who in Science Fiction, by Brian Ash (Taplinger, 220 pp., $8.95) is a book that has been needed for some time. It's a compilation of basic facts about the major—and many of

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the lesser—editors, writers, artists, etc., of our field. The entries are necessarily brief, but they seem to be well done. Naturally, I looked up a number of names of friends, and I was generally well pleased by the entries. I also glanced through it and found entries under some names that I hadn't known well, but was glad to learn about.

There is a problem in selecting the names to be covered and in assigning the importance to be given to each. This is covered in the introduction. But while I might not always agree with the compiler, I really found very little to object to.

My only hope is that this can be extended periodically and that eventually a more nearly complete coverage can be given for all entries. I suppose that will depend on the success of the book. I am assured, however, that plans are to update the book every few years.

This is an invaluable book for libraries and anyone having occasion to refer to the basic facts about writers. I've recommended it for the office use of my publisher. It's a useful book and an addition I welcome to the field.

I'm sorry I can't say as much about **Writing and Selling Science Fiction** by the Science Fiction Writers of America (Writer's Digest, 190 pp., $7.95). It's nice to know that *Writer's Digest* is interested enough in science fiction to put out such a specialized book. I just wish they'd been interested enough in it to make sure they had the best manual possible.

There are some good writers doing some of the articles: Kate Wilhelm, James Gunn, Poul Anderson, Jerry Pournelle, and Andrew Offutt. Unfortunately, some of the very basic information is covered by writers whose experience is not great enough to make them reliable teachers on those subjects.

I remember the old *Writer's Digest,* with articles on writing by the best-selling writers in the pulps. That was back in the '30s, of course. Maybe I'm biased because I grew up with Lester Dent, Erle Stanley Gardner and others telling how to write. Maybe I'd have learned as much had Joe Bflstks written the articles—but I doubt it.

Anyhow, when I turn to market advice for beginning writers, I want to see them protected by being told exactly where to go, where the money is, and what is required. And here I find such false information as the fact that a beginner can't get more than 1¢ (or possibly 2¢) a word for magazine fiction anywhere. That is nonsense, when this magazine will pay them 5¢ for short fiction.

If the writer of that article knew the rates of the magazines, he should have told beginners to try for the top pay first, and named the market. If he didn't know, he shouldn't have dared to write the article.

There's a fair amount of good material; but much too large a portion is of little use, inaccurate, or less than helpful. The book isn't worth the price. There are other books (such as *The Craft of Science Fiction)* and magazine articles that are far more useful.

In my opinion, the book is about as good as the cover art—and I can't recommend either. ■

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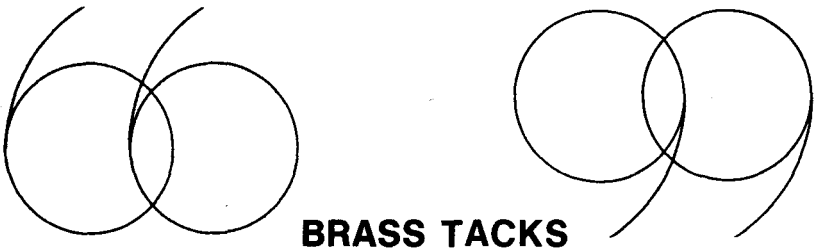

BRASS TACKS

Ben:

I was disappointed with the "fact" article by Mr. Easton, which seemed to be more of an opinionated review of Wilson's *Sociobiology*—which book has high factual content that deserved very serious attention. Furthermore . . . perhaps Mr. Easton should have asked whether the "question" of "altruism" is not itself a cultural artifact: systems of moral values (such as those that predominate in Western Cultures) which encourage or require very high percentages of monogamous matings would naturally perceive systems which do not make this requirement (or which allow low percentages of monogamous matings) to include a large percentage of nonreproducing "altruists". This is not however an inexplicable fact, as the following argument demonstrates.

A major point of Wilson's book is that the observed "social" systems of species appear to fall into very noticeable structural types, with different associated characteristic statistics. (This fact of itself is remarkable—it is quite similar to what is now known from ethnographic observations of human cultures, *and* it closely reflects what is well known about physical systems!)

Now consider this "reliability" argument: construct a network with pieces of approximately identical units, with given reliability per unit, and a given internal structure. From this knowledge, the total system reliability can be computed. If we now add more of the same type units to the system, in order to create a more complicated network, the total system reliability will drop, unless either (a) the per unit reliability is increased, or (b) redundancy of units is increased, either of which generally means "bigger" units and/or still more of them. If this argument is applied to cultural units of biological species, the basic units in question are basic biological reproductive units, or "families". Thus, a natural result of system complexity is large families!

However, family size is not unrelated to the proportion of the population which reproduces, especially if some effort is made to keep population size constant. If n_s is average family size for system s, p_s the

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proportion of adults reproducing at that size for the same system, r the growth rate per year and T the generation interval, then (with two sexes) $e^{rT} = \frac{1}{2} n_s p_s$. If we now take $r = 0$ for a species in population equilibrium, then the result is $n_s p_s = 2$. The implications of this are incredibly important:

If a population keeps its size constant and increases in complexity, so that n_s increases, then p_s must decrease (thus creating "altruists"); if a population tries to keep its moral system constant (p_s constant) and also become more complex, then it must increase family size and also accept population growth at a positive rate.

While Mr. Easton seems to be aware of some relationships between moral and social systems, his emotional concluding plea for ecologically aware moral systems simply is not adequate. If we accept for example the modern sociopolitical activist's rule of thumb that $n_s = 2$, then at what value should we set p_s? At 1.0? Or would "true freedom" require a smaller value of p_s? Of course, for bees, generally p_s gives the ultimate in social freedom, since it sets p_s at less than .01.

Furthermore, before we start to substitute new silly mythologies (suggested by Mr. Easton) for old silly mythologies already guiding our behavior, perhaps we would do well to read another modern social theorist: Claude Levi-Strauss has shown that mythological systems are closely related to the mating systems of human cultures!

As Wilson himself noted in the concluding section of his book, when social science comes of age, its implications may not be easy to accept. Surely it is of no further help when social "scientists" themselves try to pretend the results don't even exist!

PAUL BALLONOFF

Austin, Texas

In other words, "altruism" is environmentally determined . . . and ecologically enforced!

Dear Mr. Bova:

On reading your October editorial and Science Fact column, I was inspired to cool off by writing a response to some of the points you and Thomas Easton raised.

First of all, let's assume that IQ tests really do measure some index of "intelligence" in some abstract way. The race differences that show up are in any case only *statistical* differences: that is, there will still be plenty of black geniuses and white idiots. And those point differences that show up are really too small to justify the kind of attack on integration that always seems to show up in discussions about this.

But the real reason that I'm just not sure about the motives of some of Shockley's followers is that they don't follow their data to the logical conclusion, on their own analysis: whites are an inferior race!

Yep, according to IQ tests administered in their own language, the Yellow Peril is smarter than we are, if you believe that IQ tests do measure something. So how come we don't hear all those friends of Shockley demanding that the Japanese take over our economy? Why don't they want "interesting, but not too demanding" jobs for themselves,

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while we turn over the government to the Mongols?

Oddly enough, it is the environmentalist theory of those weak-minded liberals that explains this, even *predicts* this difference. Cultures that have stressed scholars and intellectualism for thousands of years are going to produce more students and more people who feel comfortable with tests, like the Chinese. People from disrupted cultures, and/or ones that have not allowed independent scholars to develop, will do poorly (like the American blacks).

There is a different problem with some of the points Easton raised. Mostly, he tries to make his data do too much.

Easton develops a good argument for the existence of a "sociability" gene complex. Okay, society is not just a psychological, but a biological need. But this says nothing about the *kind* of society that we can have.

The evidence, in fact, suggests that we have a wide range of choices as to what kind of society is consistent with our genetic limitations. Just in the past hundred years, we have had rigid police states and libertarian communes and kibbutzim, and everything in between. So far from being forced into the Skinnerian society, there is a lot of hope for us yet. But not if we cry about how bad we all are, and must be.

This gets to another weakness of Easton's article, and of many liberal ecologists: they keep arguing as if it's the fault of all of us that we have such a messed-up environment.

This just ain't so. I was never consulted when bottle and can manufacturers decided to make nonreturnable containers, and I bet there are mighty few Analog readers who were asked. I never put lead in my gasoline. Oh, I guess I don't clean up my room like I should, but that's not what we're talking about.

The real problem, it seems, is that our entire society is geared to the single-minded pursuit of profit. Let me say right now, since I'll be misunderstood anyway, that I'm not talking about the profit motive as a fair return for innovations. What I mean is the drive to squeeze the most private profit out of every situation, and hang the consequences.

Two hundred years ago, this gave us the steam engine and the Industrial Revolution. But society is very different now than then. Now, the container manufacturers can decide they will make more by having people come back to buy again and again, and no one can get them to change. According to Bradford Snell, General Motors has been buying up the mass transit industry in America for the past fifty years, and either wrecking it (like in L.A.) or forcing it to turn out an inferior product (such as American buses), because that way more people will *have to* buy cars. Seems they don't believe in that consumer's right to choose that they keep talking about.

And now, with energy, we're told that "we" are wasteful. Never mind that, first, you can't find stoves and refrigerators that are not designed to waste energy (such appliances being produced by conglomerates that also have an interest in the oil and coal industries, that sell their products to the utilities, that have to provide the energy to . . .. but you get the

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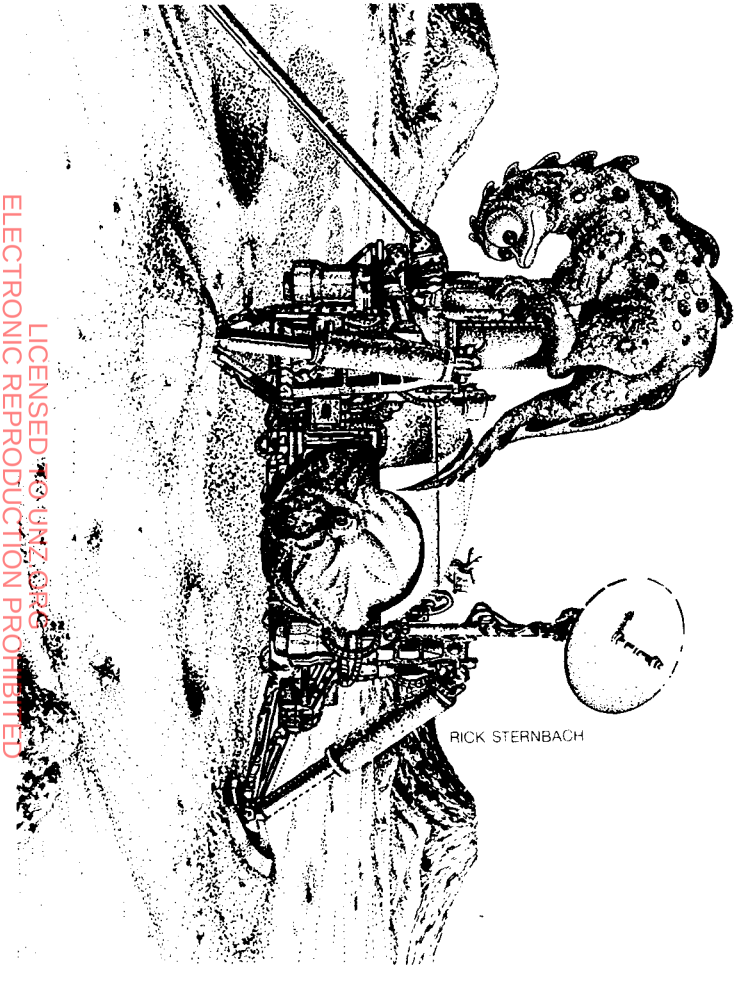

RICK STERNBACH

what's in store?

Once upon a planet dreary
came a rocket engine cheery
on a flight to test a theory
on Mars's frigid desert floor.
Did life arise spontaneous
or some alien's trash extraneous
seed the globe that now contains us?
Quoth the lander, "Either/or."

JOHN A. CARROLL

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picture). And second, that since industry consumes 70% of the energy produced in America, even if all of us consumed no energy whatever, that we would still be needing Arab oil. (Of course, to get industry to literally clean up its act, we would ask them to—gasp!—lower their profits.)

The problems are very real, and they require quick action before it's too late. But wringing our hands and moaning about how we are all guilty, and moreover, that since it's genetic, our Original Sin won't let us be redeemed, is not only not true, but wasting valuable time and energy.

We can and should solve our energy and pollution problems. And, as Easton suggests, this may mean major changes in our society. Let's just be sure, however, that the changes we propose will really solve the problem.

MICHAEL R. FEDEROW
Cliffside Apartments, D-7
Sunderland, MA. 01375

Perhaps we should let some of those high-IQ Chinese politicians and engineers come here to straighten out our problems. Of course, we would have to memorize the Little Red Book . . .

Dear Mr. Bova,

Please allow me to add to the Fact article by Easton (October '76), after having heartily agreed with his diagnosis of the direction that our global society appears to be taking. You note in your Editorial that the conclusions we draw "must be based on the evidence at hand." This is, or *should be*, a truism—and perhaps is, as far as much of physical science is concerned. However, when we turn to the social sciences, we are on much less firm ground. The rules of evidence, the logic of procedure, etc., are much the same as in physical science, but the evidence often permits the drawing of alternative, and apparently equally valid, conclusions. The nature/nurture (or heredity/environment) debate is one of these—and L. Sprague de Camp's article illustrates this perfectly, with his showing of how the same evidence *can* suffer alternative interpretations.

My own reaction to the article perhaps illustrates this. As one who prefers (note the word) the "environmentalist" side of the "intelligence argument", half-way through that article I was (mentally) puce with some negative emotion; by the end, I was sagely nodding my agreement with de Camp's summary of the evidence.

I feel that the Sociobiology dispute is another such controversy—that is, the evidence is not final enough for a firm conclusion to be drawn on either side of the divide. To expand on this: given that man is qualitatively different from other social animals—he is the only one who can both adapt to his environment, and also adapt *it* (possibly at the same time)—how are we to interpret the vast range of cultural diversity found across a range of superficially similar societies?

For example, the rise of totalitarian racism in Germany alongside (so to speak) the retention of liberal democracy in Britain—both in the 1930s—came in societies that were equally industrialized, equally liter-

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ate—although they were unequal in many other ways.

The heredity/genetic argument *could* suggest that the particular gene pool in Germany was such that the trait of a willing acceptance of authoritarian domination was coded high, whereas in Britain . . . (add your own gloss). Similarly, the environmentalist side *could* argue that what happened was one (possible?) result of the accumulation of responses to situations met and solved over time (by men with much the same genetic coding as anywhere else). I know to which argument I incline, but *that* is not at issue here.

Further, at one illogical extreme of the heredity argument lies totalitarian racism (to purify the race); at another illogical extreme of the environment approach lies, perhaps, totalitarian social engineering (to "allow" man to reach his ultimate peak of development).

And so the debate will go on, although one hopes at a lower level of commitment than that just outlined, until the evidence tilts overwhelmingly one way or the other. Until then, I will continue to choose (again, note the word) to interpret the evidence in a more (rather than less) "environmentalist" direction.

But then, as a relatively highly intelligent member of a minority group, I would, wouldn't I!

Incidentally, thanks for the Fact articles (two in twelve months!) in the area of the 'soft' sciences.

BRIAN GOLDFARB

Leicester, England

At the heart of this dilemma is the fact that it has been impossible to conduct controlled experiments on human individuals or groups. Carl Sagan suggested, in the October 1973 Analog, that space colonies might be the ideal place for such "experiments" to take place.

Gentlemen:

I make a special point of reading everything I can lay my hands on that even remotely relates to social evolution. Easton's article, "Altruism, Evolution and Society," was of interest, but my experience with social evolution in the streets—at the higher leadership levels—reveals some fallacies that turn me off.

First, genetics vs. environment as the basic influence on social behavior:

If an environment changes drastically, a given population may lose 95% of it's members, followed by genetic changes that make the offspring of the survivors better suited for the new environment.

If you want an example from the insect world, look at the resistance they rapidly develop to every new insecticide that comes along.

If you want an example from the plant world, look at alfalfa. Seed from alfalfa grown in a hot climate will not produce viable plants in a cold place. And vice versa, wet vs. dry the same. But Nebraska suffers extremes of hot vs. cold, wet vs. dry, that produce alfalfa seed that will grow anywhere. Nebraska alfalfa seed is much sought after, commands premium price, has become a major cash crop.

If you want an example from the human race, the same climatic extremes that produce Nebraska seed also produce men whose work efficiency does not drop off when they

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work in difficult climates. They are much sought after for construction work overseas. As a third-generation Nebraskan in the construction trades, I am in a position to appreciate this little-known fact.

Second, Easton deals with altruism out of context. It has an opposite, malice, which operates simultaneously in any society. When this is inserted into the formula, you get a quite different conclusion from Easton's.

This is, of course, Yin-Yang technique, but I find Yin-Yang much more accurate at the street level where I try to apply the principles which people like Easton develop.

I understand Easton is a well-known social mathematician. If so, it might be better if he used analog instead of digital techniques in developing his theories.

EUGENE AUSTIN
P.O. Box 104
Foley, MO 63347

Author Easton replies . . .

Dear Ben:

Austin is screwed up on evolution in a very common way—time. Neither physical nor social evolution can be observed in the streets. We haven't had streets long enough. What he sees is more like a change in fashion or style.

He is also screwed up on sequence. The 5% who survive a cataclysm do not *then* undergo genetic change. They survive because they are *already* genetically different from those who went under. They represent the fraction of the population with a particular set of genes. This explains the insect pesticide resistance. Alfalfa's another matter. I don't know the details, but I would expect to find that Nebraska alfalfa is marked by wide tolerances for climate and has genes that make it so. It has surely been deliberately bred for hardiness. Nebraskans, however, are not genetically different from New Yorkers unless they are descended from different stock. Nebraska hasn't been settled long enough for any evolution to have occurred. The difference he sees there is surely due to a difference in psychological set, provided the difference is real. In comparison, the Mohawk Indians have a genetic difference that makes them immune to fear of heights; they make fine steel workers. And it should be noted that they have been in existence as an evolving group quite long enough to have developed such a small difference from their neighbors.

Altruism and malice are simultaneous in society, but not in the individual. They are mutually contradictory, and both may have a genetic basis.

I am not, by the way, a social mathematician. I am a not particularly well known (yet) theoretical biologist and freelance writer.

Do you notice how Austin uses "analog" and "digital" as buzzwords? They connote computational techniques, not mathematical ones, but he doesn't seem to know the difference.

Letter to the Editor:

I must disagree with your Editorial and Mr. Easton's article because I believe Wilson's premise (a gene for social cooperation), will not have any meaningful result. Your editorial

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criticisms rest on the dichotomy between free will and determinism. The truth or falsity of this issue is an epistemological irrelevance as you will still be faced with choice, even if your genes determine the choice. (Do your genes tell you when you have the choice to lie or to tell the truth?)

As for Easton's article, it contains the same error plus two more. The first is the belief that Altruism will not involve one in problems of a teleological nature. He might read Walter Kaufman's *Without Guilt and Justice* and Robert Nozick's *Anarchy State and Utopia*. Second, why altruism as a means of social cooperation? The answer is that he does not understand the nature of individualism. Thus he cannot see Anarchy as a viable alternative if Wilson is correct. Would not government imposed cooperation be simply redundant? The advocacy of individualism is based on the premise that all other systems of social cooperation lead to the *breakdown* of social cooperation because they are based on force. Is robbery a form of social cooperation? What is the difference between the robber and the IRS agent?

He has created a strawman. I would like to see an opposing analysis of the implication of Wilson's ideas based on the above understanding of individualism rather than the Neanderthal beliefs of Easton. If nothing else the divergence of opinion will show Wilson's research is irrelevant and that you too suffer from ideological blinders.

JOHN SMALL

2125 Siesta Lane
Santa Rosa, CA 95404

Author Easton replies:

Genes can't determine choice. They bias it. We have free will, but we lean in certain directions. To paraphrase the old tag line about astrology—"The genes do not compel, they impel."

Teleology is always a problem in speaking of evolution. Survivors are by definition better fitted to survive. Nonsurvivors are not, and their mutations are forever lost. Successive generations of survivors therefore seem to change with a purpose, toward better survival ability, toward being better equipped for a particular way of life, toward being better matched to its environment. But the purpose is visible only to us and in hindsight. It does not exist in the selection of chance favorable events (mutations), and we must stay aware of this.

If everyone were altruistic, genetically or philosophically, government-imposed cooperation would indeed be redundant. But the genes for altruism are only common (presumably), not universal. I myself rather like the idea of an anarchic society in which everyone respects everyone else's right to life, liberty, property, and pursuit of happiness and the only "official" activities are things like the fire department, post office, a lost and found office for stray cats and children, and perhaps a way of organizing things the society as a whole wishes to accomplish (such as a space program). But it just ain't possible!

Divergence of opinion is probably the best way to prove a piece of research *is* relevant. If everyone agrees, then who cares?

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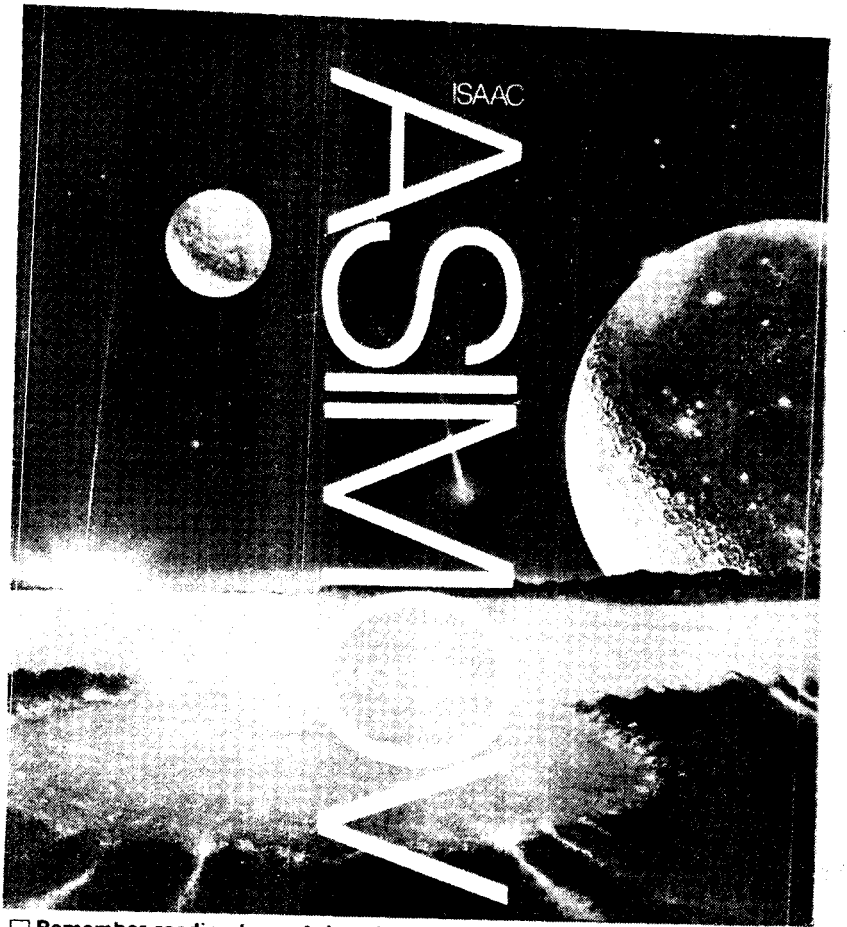

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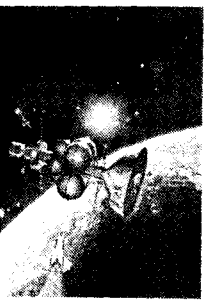

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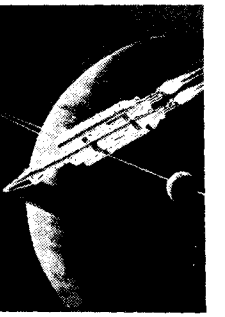

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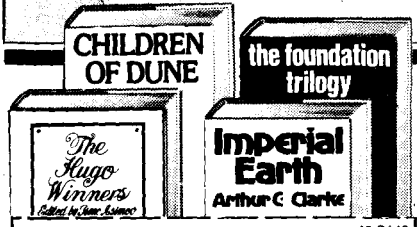

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